

TANDY LAPTOP COMPUTING

OCT. 1988

TERRY KEPNER'S

portable 100

\$3.95/CAN \$4.95



GOLD RUSH!

The Gold Card.
Megabytes of memory on a credit card.

Frazy-ology.
A free word game.
Everything but Vanna included.

Modem Power
Run your modem at 450 baud.

A 1400LT
hard drive reviewed.

74724



Tandy® Computers: The broadest line of PCs in America.



The Tandy 1400 LT

Here's a portable computer that's a true IBM® PC compatible. With a removable rechargeable battery pack built in, the Tandy 1400 LT is perfect for people on the go—like busy executives, sales personnel and journalists. Or use it like a desktop computer.

The Tandy 1400 LT features a high-resolution *backlit* liquid crystal display. The 80-character by 25-line resolution gives you the same quality of display as a full-sized monitor. And it's remarkably clear, thanks to the latest in "supertwist" LCD technology.

The 8088-equivalent microprocessor has a 7.16 MHz clock speed (vs. 4.77 MHz for most other PC-compatible portables). Standard equipment includes two 720K 3½" built-in disk drives and 768K RAM—ample memory to run today's powerful MS-DOS based programs.

The Tandy 1400 LT also includes a parallel printer adapter, RGBI and composite monitor outputs, a real-time clock and an RS-232C serial interface. You even get MS-DOS 3.2 and GW-BASIC.

The affordable
MS-DOS® based
portable
computer.

Come to your local Radio Shack
and see the Tandy 1400 LT.

Send me a 1989
RSC-20 computer catalog

Mail to: Radio Shack, Dept. 89-A-872
300 One Tandy Center, Fort Worth, TX 76102

Name _____

Company _____

Address _____

City _____ State _____

ZIP _____ Phone _____

Tandy Computers: Because there is no better value.™

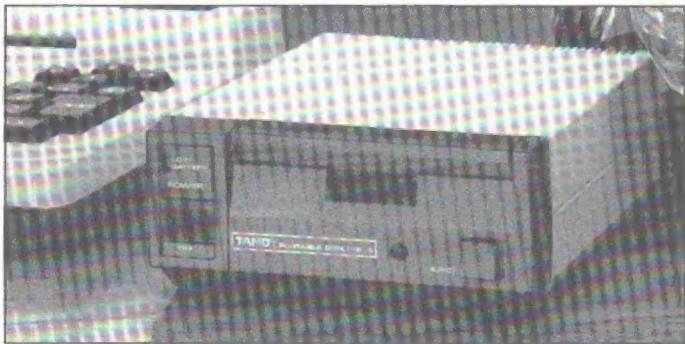
MS-DOS/Reg. TM Microsoft Corp. IBM/Reg. TM IBM Corp.

Circle 70 on reader service card

Radio Shack®
The Technology Store™

A DIVISION OF TANDY CORPORATION

FINGERS TIRED?



**Accomplish more...
in less time.
Get the P100-To-Go
monthly program disk.**

Make your life easier!

Save hours of time from typing in lengthy programs. Never worry again about typing errors. Have more fun with *Portable 100*'s new disk-of-the-month service. Every program from the magazine is included on each month's disk. No typing. No trouble.

We make it easy and inexpensive.

You deserve value. At *Portable 100* we believe in value. That's why we're not only making each month's programs available on 100K Tandy Portable Disk Drive disks, we're also making sure any extra room on each disk is packed with interesting and fun bonus programs. All files are in .DO format. Ready to load. Ready to go.

Get more from your Notebook computer.

Organize your life and be more productive with home and office management programs. Expand your knowledge with educational programs. Relax and

enjoy games or simulations. Make using your Tandy a snap with helpful and handy utilities. Easy to use. Always available.

Not just for the Tandy 100. The *P100-To-Go* disks will work with any computer that uses the Tandy Portable Disk Drive, the Brother FB100, and the Purple Computing Portable Disk Drive. This means your NEC-8201/8300, Tandy 100/102, Tandy 200, Olivetti M10, and Kytronics KC-85 can all load these programs into memory (once loaded, changes for specific computer models may be required, refer to corresponding program article for information about compatibility with particular computers).

Subscribe now and save. You can order *Portable 100*'s *P100-To-Go* disks individually at only \$9.95, but for maximum savings sign up for our **Six-pack Special**, six disks, six months of programs for only \$47.70.

Save over 30%, a savings of \$2.00 per disk.

- Yes!** Save me hours of typing time. Sign me up for your **Six-pack Special** (6 monthly disks of the *Portable 100* programs, plus the special bonus programs included with every disk) for only \$47.70.
- June '88 single issue *P100-To-Go* disk, \$9.95.
- July/August '88 single issue *P100-To-Go* disk, \$9.95.
- September '88 single issue *P100-To-Go* disk, \$9.95.

Prices include postage and handling. Please allow 4-6 weeks for delivery. Foreign airmail add \$2 per disk. All foreign, US Funds drawn on US banks only.

- Payment enclosed (check or money order)
- Mastercard VISA Amex

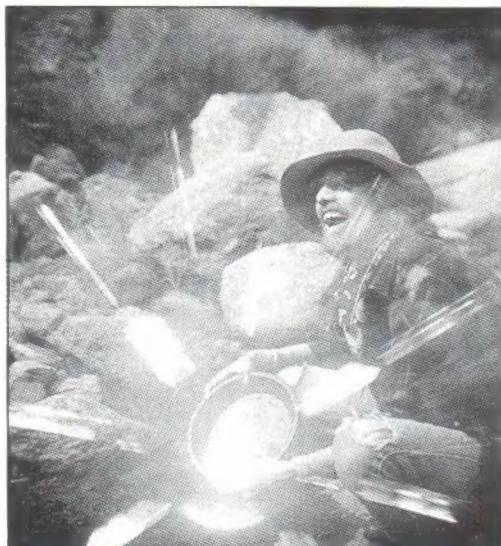
To place your order immediately, call: 1-603-924-7949

CARD NUMBER	EXP. DATE
SIGNATURE	
NAME	
STREET ADDRESS	
P.O. Box	
CITY	STATE ZIP

Mail to: Portable 100, P100-To-Go,
P.O. Box 428, Peterborough, NH 03458-0428

ON
THE
COVER:
Some nut who
thinks there's
gold in
Glendale CA.

Photo by
Mike Nugent and
Richard Brayshaw



Tandy 102

FRAZY-OLOGY

by Robert L. Wood

A game you'll have words over. For most notebook computers.

6

DYNAMITE DESKIMATE FILE TRANSFER

by David O. Rowell

Communicating between any notebook computer and the DESKIMATE software system.

10

PUT YOUR MODEM IN OVERDRIVE!

by Bob Scott

A software approach to 450-baud modem operation for the Tandy 100/102.

12

MODEM PROTOCOL

by Bob Scott

Why 2400-baud modems transmit at only 600 baud.

14

THE TRAIL TO A WORKING HARD DRIVE!

by Stephen R. Lankton

An arduous task, but well worth the effort if you have a Tandy 1400LT.

17

THE GOLD CARD

by Mike Nugent

Is this thing great, ore what? A glittering review.

21

DEPARTMENTS

ROM WITH A VIEW

3

I/O

4

NEW PRODUCTS

23

DEFUSR

25

THE CUSTOM 200

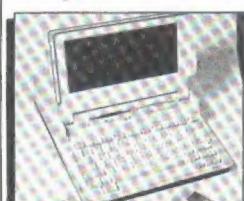
27

ADVERTISER'S INDEX

32

PORTABLE 100 CLASSIFIEDS

Tandy 600



Tandy 1400LT

ROM WITH A VIEW

Hiya!

I'm the new guy. My name is Mike Nugent. But you can call me Nuge, unless you're reading a borrowed copy, in which case you can call me for a subscription. I'm your new technical editor, and I think you'll find me well

qualified for the position, thanks to my extensive Journalism Background, which consists mainly of getting fired from my job as proofreader at the M&M factory. (Oh, just some confusion about whether it was okay to eat the ones that said "W&W.") Anyway, I'll be responsible for P100's editorial content and a lot of other things. Don't you feel safer already?

There's some marvelous stuff in store for notebook computer owners, as you'll be seeing in these pages. Support for these machines has been phenomenal. Just when you think you've seen it all, here comes something new, exciting, more powerful. Notebooks are doing things their makers never dreamed possible. Why, my Model 100 has keyboard macros, split screen TELCOM, instant cold start recovery, random access DOS, file encoding and compression, a Dvorak keyboard, several fine text processors, direct access to any PC, unlimited ROM software (on board), and a pair of 256K RAM disks. Half a meg on my lap! And I can edit a file that big without even using a disk drive. I can write Model 100 programs in "C," write my own ROM's, modify existing ROM's. And how about that new 80x25 video interface from UltraSoft? We've come far.

A few years back, there was a day when I (er) exaggerated—ever so slightly—about my income so I could charge a shiny new 8K Model 100 to a shiny new Radio Shack/Citeline card. I knew I had thirty days to find the bucks for the first payment, or I'd have to return my little dream. I got lucky. I met that deadline and those that followed. She's paid for, long since then, and all grown up. And worth every dime.

I've always loved this magazine, and now I get to help create it. I know what it is to be a subscriber looking forward to each issue. A beginner, trying to absorb every little nugget and each new insight, studying the listings to learn about programming. A veteran, exploring and pushing the limits, attempting the impossible, even succeeding at times. And many personas in between.

So I understand. And I'm determined to make P100 offer something for each of you in every issue. As we grow, I'll be able to add more pages. Beginners tutorials; public domain coverage; a forum for hints, kinks, tips, ideas; programming in BASIC and assembler, beginner and advanced; hardware and construction; and more. As I get up to speed here, we'll beef up the *Portable BBS*. It's been a tad neglected lately while we undergo our transition.

I love this job! And there's so much to share with you. If you only knew what I have to leave out of each issue! That's my only regret. Well, that and having to show up at 8:30 AM on a regular basis. I don't miss my old job. Heck, I don't even miss eating "W&W's." They're too hard to peel anyway.

Nuge

CHIEF EXECUTIVE OFFICER

Marlene Butland

PRESIDENT/PUBLISHER

Terry Kepner

EXECUTIVE VICE PRESIDENT

Mark Robinson

EDITOR-IN-CHIEF

Terry Kepner

FEATURES EDITOR

David Klein

TECHNICAL EDITOR

Mike Nugent

NEW PRODUCTS EDITOR

Linda Tiernan

CIRCULATION MANAGER

Shauna Crowley

ADVERTISING DIRECTOR

Randy Byers

BOOKKEEPING

Carrie Hebert

ART DIRECTION and DESKTOP PUBLISHING

Diana Shonk Wallace

ACROSS THE BOARD

Graphic Design, Inc.

8 Windy Row

West Peterborough, NH 03468-0091

Portable Computing International Corporation

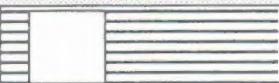
145 Grove St. Ext., #21, PO Box 428
Peterborough, NH 03458-0428

Editorial
603-924-7949

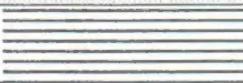
Advertising
603-924-9455

Circulation
603-924-9455

Bulletin Board
603-924-9770
(300/1200—8, None, 1)



Toolbox



Manuscripts were typed into Microsoft Word 3.0 on a Tandy 1400 LT (dual drive, 640K), where they were edited, spell-checked, and had basic format instructions inserted. From there they were loaded into a Tandy 4000 (80386 CPU, Tandy EGA Monitor, Tandy LP-1000 LaserPrinter) desktop computer and placed into Aldus' IBM PageMaker 2.0a. There they were dummed into a rough approximation of the magazine's final appearance. Here, pull quotes are placed, headlines, intros, and bylines are sized and positioned, and advertisements are allocated space.

Next, the magazine (divided into sections) was ported over to Diana Wallace's Macintosh Plus, using the 1400 LT and

Mac-link. Diana then went over the publication using Aldus Macintosh PageMaker 2.0a, page-by-page, making final design decisions on photo, figure, and listing sizes and placements. She precisely placed the text and added all the little things that go into making a nice looking publication.

Approximate page previews were output from her Apple LaserWriter Plus. When everyone was satisfied with the appearance, the Macintosh disk was sent to Colorite Corp. in Wisconsin for final output directly onto film (and in some cases, photographic paper). The film was then delivered to the printer, who printed it, labeled it, and mailed it to you.

Portable 100 (ISSN 0888-0131) is published by Portable Computing International Corporation, 145 Grove Street Ext., P.O. Box 428, Peterborough, NH 03458-0428. *Portable 100* is an independent journal not connected with any hardware, software, or peripheral equipment manufacturer. *Portable 100* is published monthly, except for a combined July/August issue in the summer. Entire contents Copyrighted 1988 by Portable Computing International Corporation, All Rights Reserved. No part of this publication may be reproduced without written permission from the publisher. Portable Computing International Corporation makes every effort to assure the accuracy of articles published in *Portable 100*, but assumes no responsibility for damages due to errors or omissions. Subscription Service: All subscription correspondence should be addressed to *Portable 100*, Portable Computing International Corporation, 145 Grove Street Ext. P.O. Box 428, Peterborough, NH 03458-0428. U.S. subscription rates: \$24.97, one year; \$53 two years. Canada and Mexico: US\$29.97, one year; US\$61 two years. All other foreign (surface mail): US\$44.97, one year; US\$85 two years. Foreign Air Mail, add US\$650 per subscription year. All payment, except Canada, U.S. funds drawn on U.S. Bank. Second-class postage paid at Peterborough, NH 03458, and at additional mailing offices.

POSTMASTER: Send address changes to:
Portable 100, Portable Computing International Corporation,
145 Grove Street Ext., P.O. Box 428,
Peterborough, NH 03458-0428.

Miscellaneous Tandy 100 Requests

After having purchased my Model 102 recently, I was totally amazed by the RAM staying there with the power off. I was also amazed by the ease of capturing Text files and Messages from BBS's. I download them and read them, and reply to my messages during lunch or whenever I have time. The little beast would have been perfect with a 1200 baud modem built in. After having purchased only two copies of your magazine, I have seen many requests for back issues and articles. I have also seen several articles where someone has made reference to one or more of their favorite back issues. Well, this might seem quite silly, but, couldn't you and they get together and re-issue some of the more important and useful articles?

I would also like to see some more technical articles and maybe some homemade projects, like the direct connect modem cable (which is nothing more than two modular phone cables and an eight pin DIN connector). I cannot see why Radio Shack makes me purchase the cable for twenty dollars. Not everyone wants to sign up for CompuServe.

I would also like to see some data on which ROMs are used by the Model 102 so I could burn my own Eproms. The only place I saw anything even close was a company that had a \$500.00 minimum purchase order. Now, what am I going to do with that many ROM chips? There must be an easier way.

I connected to the CLUB 100 and signed up for membership, and have since placed an order for several items. VERY IMPRESSIVE SERVICE!!! I logged on Sunday night and received their INDEX package on

The WorldPort 1200 is smaller than a cigarette pack.

Tuesday (I live in Chico) Is that fast or what!

Dale Edmondson
Chico, CA

Yup, 1200-baud built-in would have been nice! Are you aware of the tiny 1200-baud, external modems available? One example, the Worldport, is smaller than a pack of cigarettes, and a built-in version is available with Traveling Software's Booster Pak.

Good idea about reissuing early P100 articles. We'll consider it. Of course, you can always order photocopies of individual articles in the meantime. See the ad on page 30 in this issue.

There are some technical and hardware construction articles planned (and plenty in back issues). Any volunteers to do the modem cable project?

And as for ROM work, check with King Computer Services. They can help you find what you need and have a few products to aid in development. In fact, company president, Mo Budlong, has just released a technical book on option ROM programming (see ad on page 11 in this issue) that reveals some great technical info and long-guarded secrets. We hope to do a review of the book in the future. After just a quick reading, I'm impressed and eager to study it in depth.

-MN

WHAT'S THE SKINNY ON P100?

I love P100, but, I wish it contained more articles. Sometimes the maga-

zine is so thin, I wonder if I am getting enough magazine for my money. I realize it is tough to find authors for such a specialized topic, but have you ever tried CompuServe? A plea on CompuServe might stimulate the creative processes for articles.

I would also like to see a tutorial column on assembly language on the Tandy 200. I am very interested in assembly language, but have trouble finding any good articles about it.

Edward G. Murphy
Alexandria, VA

Thanks for your concern and suggestions. Actually, we have many good authors and some great stuff on the way (some of it from CompuServe's sharpest Model 100 Forum programmers), including that assembly language column. We're just going through a transition right now. As P100 grows, you'll be seeing more — umm — well, growth!

-MN

RUDE AWAKENING?

In reference to the May, 1988, issue of Portable 100 and the "REVEILLE" article by Richard D. White, there must be something wrong in your magazine printout of the program. I have enclosed a copy of my entry. When I try to run it on my 102, all I get is ?OD Error in 1100. Please have Mr. White check your printout, or something, for I'm going batty trying to run it. Also, Mr. Sherman contacted me in reply to my letter to you on the "SLOT MACHINE" game. Thanks a million! That makes for great satisfaction.

William J. Yearsley
Plymouth Meeting, PA
Glad to help! I've returned your listings with corrections indicated. I'd like to share the answer with our readers to help them avoid one of the most common prob-

lems we hear.

An ?OD error means a program was told to READ a certain number of DATA items (separated by commas) but ran out of data before that number was reached. Your problem was a simple case of missing commas. If you leave out a comma, the computer reads two adjacent data items, thinking they're only one item, and thus, the count comes up short. This also happens when someone accidentally leaves out a data item. So when typing DATA statements, it's extra important to double- and even triple-check your work. It's too easy to make a mistake with all those numbers making you cross-eyed.

Unfortunately, now you'll have no excuse for oversleeping! -MN

INTERESTED IN FORTH?

In the March I/O column reader Philip Ouellette mentioned that he was interested in FORTH for the M100/M102, boy have I got a deal for him!

Enclosed are two 3.5" Tandy PDD-I disks containing the *figFORTH* system that I put together for the M100. The system on these disks is a bit improved from the version that I uploaded to CompuServe a year ago. With a little coaxing Jay Holovacs would probably tell us how he uses the PDD and *POWR-DOS* directly from the *FIG4TH*. As I understand from my CompuServe mail, *FIG4TH* can be modified in the suggested manner to run on the NEC and the M200. Trouble is, the folks that did the job didn't upload a *HOW-TO* file. Anyway, you only need to know where a few ROM routines are located to do the conversion.

The system is all there, it works very well, it's public domain, enjoy it. If anyone wants to avoid the bother of downloading some 85K of ASCII files, I'll supply a disk with all the .DO and .CO files for \$10.00. Keep up the good work. I'd appreciate the return of the disks someday, perhaps after you send them to Dave Thomas for the GENIE system. Dave helped me a lot with the original uploads to CompuServe.

David O. Rowell
Marietta, NY

What can we say? THANK YOU, DAVE! I'm sure many fellow notebook

types will appreciate your contribution. Availability of your package on our PBBS (Portable Bulletin Board System) will be FORTH-coming. And as requested, we passed it on to Dave Thomas for sharing on the GENIE LAPTOPS Roundtable. MN

BASIC COMPILER?

Is there a BASIC compiler out there for Tandy Models 102 & 200? So far all of my sources have led me to

Is there a BASIC Compiler out there?

answers that are less than coherent. I can't even get the part number for the special ROM holder that inserts into the ROM option socket.

Gerald Maisonneuve
San Diego, CA

There's no official announcement, but word has it that King Computer Services is developing one. They already have a PC-based cross compiler for the C language on the Model 100/102 and a PC-based cross assembler. Who knows— maybe by the time you read this ... ?

-MN

ENHANCEMENTS

The APOGEE.BA and ROCKET.BA programs (Portable 100, July/August '88) were written for the Model 200. Now I have a version for the 100. There are many differences between the programs because of the different screen sizes; the programs each fill the Model 200 screen!

Therefore, I found it necessary to use screen control commands.

The two new programs are named ROCK-1.BA and APOG-1.BA and will "talk" to each other as did the original ones.

Nelson E. Bohall
Edmonds, WA

Thanks for the changes. The revised programs will be included in Portable 100's P100-To-Go monthly program disk for the July/August issue.

Also, while we're mentioning it, we will include an enhanced version of the

BARCODE For LAP-TOP'S

BARCODE SYSTEM ROM FOR MODEL 100
SCANS, PRINTS, UTILITIES, CALCULATOR,
PROGRAMMABLE APPLICATIONS BUILT-IN.
BARCODE PRINT-GENERATOR SOFTWARE.
BARCODE SYSTEM CARD FOR PC's, AT's,
BARCODE SCANNERS • LASERS
DECODERS • SLOT-READERS
PC EXPANSION CARDS

OPTICAL DATA SYSTEMS INC. CALL: (619) 745-6563

Circle 15 on reader service card

program shown in the article "Quick, Easy and Cheap Model 100 to MS-DOS Computer File Transfers," from the same issue (July/Aug.). These, too, will appear on that month's P100-To-Go disk (for more information, see ad on p. 1 of this issue).

-Eds

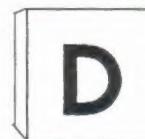
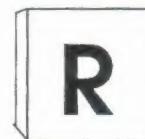
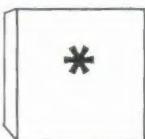
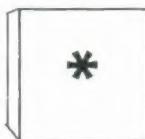
?IO-CORRECTIONS

The manufacturer's specifications on p. 18 of the LapDOS II review (Jul/Aug. issue) should have stated **1,700** bytes of free memory are required in the notebook computer (not 17,000 for heaven's sake!).

-MN

We welcome all letters from our readers, whether critical or complimentary. We print as many letters as space permits (some are edited for space considerations). Address your correspondence to: Portable 100, I/O Dept., P.O. Box 428, Peterborough, NH 03458-0428.

COMPATIBILITY: Tandy 100/102, 200; Kyotronic85; NEC 8201A/8300 (with changes); UNTESTED: Tandy 600, 1400LT; Olivetti M10



FRAZY-OLOGY

A game you'll have words over.

by Robert L. Wood

Our family has a fascination for word games, crossword games, letter cube games, and television game shows. My wife and I also like twenty questions (animal, vegetable or mineral?) when traveling. So we wanted to write a game program for the Model 100 combining the best features of these.

As a result, we created a game where two players enter phrases and guess them. Thus were sown the seeds for a game I call Frazy-ology (phraseology).

We decided that the program needed certain basic necessities, which included:

1. A way to enter a phrase;
2. Converting phrases and guesses to upper case (to ensure that *e* matched *E*);
3. Converting phrases to symbols;
4. Replacing symbols with guessed letters;
5. Typing in players' names;
6. Keeping track of players' turns;
7. Ignoring punctuation;
8. Deciding if a phrase is accurately guessed.

PROBLEM SOLVING

Entering the phrase: This part was fairly easy. Although I had never used *LIN INPUT* in a program before, I knew I would have to use it, because *INPUT* does not accept the necessary punctuation marks (see line 320).

Converting the entry to capital letters: I used *LEN* to set the length of a loop, (see lines 325-390), which goes through the phrase, and I used *MID\$* to check each ASCII value. If you check your ASCII table, you will see that upper-case letters have ASCII values of less than 96, whereas lower-case letters have values of more than 96. Subtract the ASCII value of any upper-case letter from its lower-case equivalent and you'll always get the value 32. Thus, if the ASCII value is more than 96, the entry is either not upper case or is not a letter, so I had the program substitute the lower-case letter value with an ASCII value of 32 less (line 375).

```

10 CLEAR600:R=VAL(RIGHT$(TIME$,2))+1
20 FOR X=1TO R
30 RS=INT(RND(1)*5+1)
40 NEXT X
45 CLS:LE$="0123456789 ,-.?ABCDEFGHIJKL
MNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz
":PRINT
51 PRINT " ****
52 PRINT " *
      *
53 PRINT " * FRAZY-OLOGY FOR PORTABLE
100  "
54 PRINT " * By Robert L. Wood
      "
55 PRINT " *
      "
56 PRINT " ****
*****"
57 PRINT " <PRESS ANY KEY TO CONTINUE> ";
58 I$=INKEY$: IF I$="" THEN 58
60 CLS:SC(1)=0:SC(2)=0
70 PRINT@90,"Instructions (Y/N)":PRINT@1
62,"At the end of the instructions, pres
s any key to continue."
80 A$=INKEY$:IF A$="" THEN 80
90 IF A$="y" OR A$="Y" THEN 110 ELSE 210
100  *** Instructions ***
110 CLS:PRINT:PRINTTAB(5)"Two players tr
y to guess a phrase"
120 PRINT"entered by the other. A runni
ng score"
130 PRINT"is kept on the screen of 1 to
5 points"

```

Continued.

Frazy.BA, a neat, entertaining program.

Displaying a symbolic representation of the phrase: Again, I used *LEN* to loop through the phrase in conjunction with *MID\$ (PHRASE\$ (PLAYER), POSITION, 1)* in lines 410-490 to pick out each letter. Then the program rebuilds the phrase in a different variable. It passes spaces and punctuation directly to the new variable (lines 440-467), but substitutes an asterisk for each letter (line 470).

Replacing the symbol with the correct letter: This was a challenge. When I started the program I thought *INSTR* could do the job, having vaguely remembered seeing it do a similar job in some program listing somewhere. I looked up *INSTR* in the *BASIC* books I had and then wrote a few short programs of a few lines each until I understood it would return the position in the string of the first occurrence of whatever I was testing for. So if *INSTR* doesn't find the tested-for alphanumeric, it returns a 0. Thus, in the program *N = INSTR(PHRASE \$(PLAYER), "A")* formula, *N* would equal 1 if *A* were in the first position of the string, *N* would equal 2 if *A* were the second position in the string, and *N* would equal 0 if *A* were not present in the string.

When I started the program I thought *INSTR* could do the job.

Here I had another problem to overcome. *INSTR* returns only the FIRST occurrence of a letter. To see if the tested letter appeared more than once, then, I had to remove the first occurrence from the string and substitute something for it. Since at this point there were two copies of the string, one actual and one with asterisks (on the display) as symbols representing the letters, the easiest solution appeared to be to swap each letter, as it was guessed, from the real string to the symbolic string (lines 640-650) and to swap the corresponding asterisk to the actual string. This proved to work very nicely.

Miscellaneous: At this point, I set up variables to enter and keep track of the players' names (lines 210-250), actual phrases (lines 270-390), symbolic phrases (lines 410-490), and incorrect letters (lines 620).

The program (which actually started at the line 210) was ready to test.

One flaw became apparent almost immediately when my wife guessed my whole phrase in one turn and won the game without me getting any guesses. We felt we could improve the game if it revealed and credited all occurrences of a guessed letter the first time it was guessed (as the game now stood, if the letter *E* appeared three times; you'd have to guess it three times to get all occurrences; further, if you guessed a fourth *E*, the program would consider it a wrong guess).

```

140 PRINT"for each correct letter, 5-25
point"
150 PRINT"bonus if the whole phrase is g
uesed."
160 PRINT"      If a letter appears more
than once"
165 PRINT"all occurrences will show."
170 A$=INKEY$:IF A$="" THEN 170
180 CLS:PRINT:PRINTTAB(5)"Incorrect lett
ers appear at the"
190 PRINT"lower left of the screen. An
incorrect"
192 PRINT"guess ends the turn."
194 PRINT TAB(5)"The following alphanume
rics are"
196 PRINT "legal to use: #123456789 ',,-
?ABCDEFGH";
198 PRINT "IJKLMNOPQRSTUVWXYZ. Except n
ames, all"
199 PRINT "small letters will convert to
caps."
200 A$=INKEY$:IF A$="" THEN 200
210 FOR X=1TO2
220 CLS:PRINT:PRINT:PRINTTAB(5)"Enter th
e name of player #";X;"      then p
ress <ENTER>"
230 PRINT:PRINTTAB(4) "
240 INPUTN$(X):IF N$(X)="" THEN 240
250 NEXT
260 '
270 FOR X=1TO2
280 CLS:PRINT
290 IF X=1 THEN OP=2 ELSE OP=1
300 PRINT@88,N$(X);", enter a phrase":PR
INT@128,"for ";N$(OP);" to guess"
310 PRINT
320 PRINT@204,"";:LINE INPUT E$(OP)
325 FOR Y=1TO LEN(E$(OP))
330 CR$=MID$(E$(OP),Y,1)
340 T=INSTR(LE$,CR$)
350 IF T<>0 THEN 375
355 PRINT@200,STRING$(40,32);
360 PRINT@204,"Illegal alphanumeric in e
ntry ";CHR$(34);CR$;CHR$(34);
365 PRINT@244,"Please re-enter phrase";
370 FOR D=1 TO 500:NEXT D:PRINT@200,STRI
NG$(40,32);:PRINT@240,STRING$(40,32);:GO
TO 320
375 IF ASC(CR$)>96 THEN MID$(E$(OP),Y,1)
=CHR$(ASC(CR$)-32)
380 NEXT Y
390 NEXT X
400 '
410 FOR X=1TO2

```

Continued.

ENTERTAINMENT

To equalize players with slightly different word skills, we decided to assign a random score for each occurrence of each letter guessed and a bonus for completing a phrase.

FURTHER PROBLEM SOLVING

Equal turns: To ensure equal turns, I set up a variable in the win routine (lines 800-850). This ensures that if player 1 guesses a phrase, the program returns to the main routine to give player 2 one more turn.

Extra occurrences of guessed letters: This logic was the hardest of the changes to implement, because the original phrase had to be searched repeatedly until there were no more occurrences of the letter, yet without charging a guess each time or forfeiting a turn because of a *wrong guess*. The solution was to set a flag variable (CL) to tell the program it is rechecking a correct guess. The flag is set or reset (line 660), then told to skip or not skip the input (line 585).

Score: A variable is set up to hold the score of each player (line 60). The program seeds the random number sequence by the clock (lines 10-40). A random score of one to five points is generated (line 520) and, for a correct letter guess, is added to a player's score (line 630). The program generates a random bonus (five to twenty-five points), which it adds if a player completes a phrase (line 540). Note that line 540 also checks to see if a phrase is completed by using *INSTR* to see if there are no more asterisks, *INSTR (PHRASE\$(PLAYER), "*")=0*.

All that remained was to put in the title screen, the on-screen instructions, and the end screen, all straightforward tasks. We played the game a number of times and eventually, we submitted it to *Portable 100*.

ONE FINAL PROBLEM

One day, I received a call from Mike Nugent of *Portable 100*. The magazine was considering the program for publication, but he was making strange things happen to it by entering such characters as carriage returns and asterisks when a letter guess was called for. He asked me if I could "bullet proof" the letter guess. The resulting code (lines 592-598) shows one way of rejecting unwanted inputs before they are checked against the string. You compare the ASCII code of the input to the codes you want to allow. If it is a legal code, you bypass line 596, which gives the error message, and line 598, which reprints the wrong-letter list and sends the flow back for a new input.

I soon realized that if I was to limit the letter guess input, then I would have to limit what could go into the original string to the same characters that could be guessed. At this point, I recalled something I had read, about using a *filter* to check for legal input, and my newly found mastery of *INSTR* added a new dimension. I established a legal entry (LE\$) filter in line 45. Here the program breaks down the input string, letter by letter, by looping through it. It checks each letter to see if it is in the filter string (lines 325-350). If the letter is legal, the program passes control to line 375. If not, lines 360-365 issue the error message, display the illegal entry, and (line 370) return the flow for a new input.

```
420 FOR Y=1 TO LEN(E$(X))
430 CH$=MID$(E$(X),Y,1)
440 IF CH$=CHR$(32) THEN P$(X)=P$(X)+CHR
$ (32):GOTO 480
450 IF CH$=CHR$(39) THEN P$(X)=P$(X)+CHR
$ (39):GOTO 480
455 IF CH$=CHR$(44) THEN P$(X)=P$(X)+CHR
$ (44):GOTO 480
460 IF CH$=CHR$(45) THEN P$(X)=P$(X)+CHR
$ (45):GOTO 480
465 IF CH$=CHR$(46) THEN P$(X)=P$(X)+CHR
$ (46):GOTO 480
467 IF CH$=CHR$(63) THEN P$(X)=P$(X)+CHR
$ (63):GOTO 480
470 P$(X)=P$(X)+"*"
480 NEXT Y
490 NEXT X
500 P=1:OP=2
510 CLS
520 RS=INT(RND(1)*5+1)
530 PRINT@43,"It is ";N$(P);"'s turn to
guess!";
550 PRINT@85,N$(1);"'s score=";SC(1)::PR
INT@125,N$(2);"'s score=";SC(2)
560 L=INT(LEN(P$(P)))/2
570 PRINT@200,CHR$(27)"K";:PRINT@220-L,P
$(P)
580 PRINT@280," Wrong letters ";G$(P);
582 IF INSTR(P$(P),"*")=0 THEN SC(P)=SC(
P)+INT(RND(1)*21+5):BEEP:FOR D=1 TO 500:
NEXT D:GOTO 800
585 IF CL=1 THEN 630
590 A$=INKEY$:IF A$="" THEN 590
592 IF ASC(A$)=39 OR ASC(A$)=44 OR ASC(A
$)=45 OR ASC(A$)=46 OR ASC(A$)=63 THEN 6
00
593 IF ASC(A$)>47 AND ASC(A$)<58 THEN 60
0
594 IF ASC(A$)>64 AND ASC(A$)<91 THEN 60
0
595 IF ASC(A$)>96 AND ASC(A$)<123 THEN 6
00
596 PRINT@280,STRING$(38,32)::PRINT@280,
" Illegal alphanumeric";:FOR D=1 TO 500:
NEXT D:
598 PRINT@280,STRING$(38,32)::PRINT@280,
" Wrong letters ";G$(P)::GOTO 590
600 IF ASC(A$)>90 THEN A$=CHR$(ASC(A$)-3
2)
610 T=INSTR(E$(P),A$)
620 IF T=0 THEN G$(P)=G$(P)+A$::GOTO 680
630 SC(P)=SC(P)+RS
640 MID$(P$(P),T,1)=A$
650 MID$(E$(P),T,1)="*"
```

Continued.

```

652 T=INSTR(E$(P),A$)
655 IF T<>0 THEN CL=1 ELSE CL=0
660 GOTO 520
670 '
680 CLS:PRINT:TC(P)=TC(P)+1
690 IF P1=1 OR P2=1 THEN IF P=1 THEN P=2
ELSE P=1:GOTO 800
700 SOUND 12538,20
710 PRINTTAB(14) "Wrong Guess"
720 PRINT
730 PRINT TAB(11) "Your turn is over!"
740 IF P=1 THEN P=2 ELSE P=1
750 IF OP=1 THEN OP=2 ELSE OP=1
760 PRINT:PRINT:PRINTTAB(10)"<PRESS ANY
KEY> - "
770 A$=INKEY$:IF A$="" THEN 770
780 GOTO 510
790 '
800 IF P=1 THEN P1=1
810 IF P=2 THEN P2=1
820 TC(P)=TC(P)+1:IF P1=P2 THEN 860
830 IF TC(P)<=TC(OP) THEN 860
840 IF P=1 THEN P=2 ELSE P=1
850 IF OP=1 THEN OP=2 ELSE OP=1:GOTO 520
860 FOR X=1TO 3:SOUND 2793,50:NEXT X
870 IF P1=P2 THEN CLS:PRINT:PRINTTAB(10)
"This round is a tie!":GOTO 900
880 ' FOR X=1TO 3:SOUND 2793,50:NEXT X
890 IF P1<>P2 THEN CLS:PRINT:PRINTTAB(10)
)N$(P); " won this round!"
900 PRINT
910 PRINT"      ";N$(1);"'s score is";SC(
1):PRINT"           ";N$(2);"'s score is"
;SC(2);
920 '
930 PRINT:PRINT
940 PRINT "* To play again hit any key b
ut <ESC> *";
950 A$=INKEY$:IF A$="" THEN 950
960 IF A$=CHR$(27) THEN 1000
970 FOR X=1TO 2:G$(X)="":TC(X)=0:P$(X)="
":NEXT X
980 P1=0:P2=0
990 CLS:GOTO 270
1000 CLS:PRINT:PRINT
1010 IF SC(1)=SC(2) THEN PRINT TAB(11) "T
he game is a tie!"
1020 IF SC(2)>SC(1) THEN PRINT TAB(2)N$(2); " won by";SC(2)-SC(1); " points!"
1030 IF SC(1)>SC(2) THEN PRINT TAB(2)N$(1); " won by";SC(1)-SC(2); "points!"
1040 PRINT:PRINTTAB(7) "A SoftWood System
s Program"
1050 PRINT TAB(12) "For PORTABLE 100":END
End of listing.

```

You can easily change characters allowed in the string by adding to or subtracting from the filter or adding to or subtracting from the ASCII codes. If you change LE\$, however, be sure to leave a space character in it, or you will get an illegal alphanumeric message because of the space between words.

You can add spice to the game by restricting a round or a whole game to a certain category like book, play, or movie titles, or perhaps famous people like sports figures, politicians, or movie stars. You can use biblical sayings or characters, fictional characters, famous sayings and quotations or just about anything you can imagine.

As for my updates, now my wife and I are contemplating whether the bonus for the completed phrase is large enough. □

Compatibility Notes:

This game will run equally well on the Tandy 200 with no changes. The bottom half of the T200 screen simply remains unused.

To change the program to work on the NEC 8201A and 8300, add these lines:

```

5 SCREEN 0,0
2000 TMP$=LEFT$(TMP$,Z1)+X$
+MID$(TMP$,Z+LEN(X$)):RETURN

```

And change these lines to:

```

375 IF ASC(CR$)>96 THEN
X$=CHR$(ASC(CR$)-32):
TMP$=E$(OP):Z=Y:GOSUB 2000: E$(OP) =
TMP$
640 X$= A$: TMP$= P$(P):Z=T: GOSUB 2000:
P$(P) = TMP$
650 X$= "": TMP$= E$(P): Z= T: GOSUB 2000:
E$(P) = TMP$

```

Change all PRINT@ statements to LOCATE statements followed by PRINT statements. Use the form LOCATE pMOD40,p\40:PRINT (where p = the PRINT@ location). Note that the backslash (\) is used for integer division. Some examples:

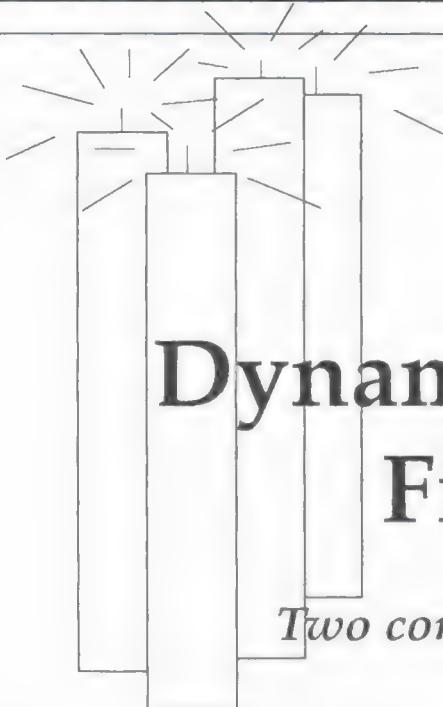
70 LOCATE 90MOD40,90\40:PRINT" At the end
of the instructions..."

300 LOCATE 88MOD40,88\40:PRINT N\$(X);",
enter a phrase":LOCATE 128
MOD40,128\40:PRINT "for ";N\$(OP);" to
guess"

Include the complete expression for the PRINT@ 220-L
location in line 570:

570 LOCATE 200MOD40,200\40:PRINT CHR\$(
27) "K"; LOCATE (220-L)MOD40,(220-
L)\40:PRINT P\$(P)

As for scoring, the Woods's chose to call it a tie if they
guessed the phrases in the same number of turns, rather
than going by total points. If you prefer to go by total points,
change each occurrence of P1 and P2 in lines 870 and 890
to SC(1) and SC(2), respectively.-MN



Dynamite DESKMATE File Transfer

Two computers are better than one.

by David O. Rowell

Many of us who use the Model 100/102/200 (or NEC-8201/8300, Olivetti M10, etc.) also own another Tandy computer that has the *DeskMate* program. And often, we want to use *DeskMate*, and data we've worked hard to acquire using one machine, on the other computer. I think you'll find it a lead pipe cinch to transfer files among the *Telcom*- and *DeskMate*-equipped machines as explained below. All you need is a null modem cable. (Editor's note: Last issue we published an article on one way you can make your own null modem cable.)

SET UP A LOG FILE

To make transfers convenient in the future, first, create a *DeskMate-Telcom* log file that will set up the RS-232 port parameters at the press of a button. Here's how to do that. Run the *DESK* program. At the initial *DESK* screen, move the cursor to the right to *Telecom* and press *ENTER*. Press *F4* to begin the "EDITLOG" function. Type a filename for the log file that makes sense to you, I use *LAP68N1E* (as a reminder of the M100 status parameters), and press *ENTER*. Press *F1* to enter the *Telecom* status screen. Use these status options: Autodial modem, NO; BAUD rate, 2400; Data word length, 8 BITS; Parity, None; Number of stop bits, 1 BIT; Xon/Xoff flow control, ON; ASCII character filter, OFF; Line feed filter, OFF; Echo (half duplex), ON; and Redial, 0.

(Set the ASCII character filter ON if you want to strip control and graphic characters on transfer.) Press *F12* to

enter these options into the file. Press *F12* to save the *LOG* file to disk.

BEGIN THE TRANSFER PROCESS

Now you're all set for fast, easy file transfer between the Model 100 and the other computer with *Telecom*. Just hook up the cables between the M100 and the other computer.

Then boot up the *DeskMate* program, and put the cursor on *Telecom* and then on *LAP68N1E*. With that file name in front of you to remind you of the parameters, turn on the M100 and run the *TELCOM* program. Press *F3*, (*STAT*), and type *68N1E* and press *ENTER* to set up the RS-232 port at the same parameters as the other computer. Press *F4*, (*TERM*), to go into the terminal mode. Press *F4* again, if you need to, for half duplex.

Now go back to the first computer and press *ENTER*. In a few seconds, the screen should clear, and the two machines will be in communication (you can tell because the lower right corner of the *Telecom* screen says *CONNECTION OK*). The procedure is so easy

When an outline or text file becomes too long for the Tandy 100's memory, I zip it over to the Tandy 2000.

that this function alone may persuade you to buy *DeskMate* for your MS-DOS machine!

With this setup you can transfer files in ASCII format between the two computers quickly, accurately, and easily. Transferring anything but text files is probably futile anyway, because the other computer can probably do little with files in other formats. Different machines

The Secrets of ROM Revealed!

Find out how to put your favorite machine-language Model 100/102 programs on option ROM

Most computer owners can "burn" ROMs for their machines, and yet for the Tandy Model 100/102, a machine specifically designed for custom programming via optional plug-in ROMs, the methods for doing so have been a closely guarded secret for years.

Now you can take advantage of the extra 32K worth of storage space on your Tandy Model 100/102 computer.

The Secrets of ROM Revealed contains concise, easy to understand information, written by an author with years of experience with the Model 100 computer and option ROMs.

This new book gives you: * Source code, * Complete listings of everything you need to call standard ROM routines from an Option ROM, * The source code for a complete option ROM program that does a Search-and-Replace on text files, * A chapter on calling the text editor from .CO and Option ROM programs, * Lists of resources to get you started—asmbers, ROM burners, etc., and even * A chapter devoted to tackling how to write option

ROMs for the Tandy 200 and NEC-8201A.

This is the book that brings the Model 100 out of the dark ages and makes one of the most powerful undocumented features available to everyone.

The Secrets of ROM Revealed, with an IBM PC diskette containing the source code for key routines and the search-and-replace utility costs just \$52.95, shipping and handling charges included. The book *The Secrets of ROM Revealed*, alone, is \$42.95, shipping/handling charges included.

Portable Computing
International Corporation
P.O. Box 428
Peterborough, NH 03458-0428
Your source for Tandy Model 100/102 books.

A simple program that makes the TELCOM F6 key tell you how much memory your 100/102 has left and the F7 key to tell you the names of the programs you have in RAM, all while on-line.

tokenize BASIC programs differently, so they merely crash when you try to run other machines' programs on them. Chances are good that one model of computer couldn't use another's machine language program even if it had the same processor. So if the file must be edited anyway, why not transfer an ASCII file?

A CONVENIENT WAY TO WORK ON LARGE FILES

I've formed the habit of writing and debugging BASIC programs on my Tandy 2000, saving them as ASCII files (that is, in the BASIC interpreter, type SAVE "SOMENAME.DOC",A) and then transferring them to my M100. There I edit the display screens and crunch the final program to save space. When an outline or text file becomes too long for the M100's memory I zip it over to the Tandy 2000 where there's more room (not that I like it better, but it has a big screen and more memory).

If you use filenames with the extension .DOC, DeskMate recognizes them as text files. So it displays them on the "Main Menu" and lets you work with them in the "TEXT"

DeskMate
recognizes them
as text files.

```
1 FOR LOZ=-1268 TO -1265
2 READ CT%: POKE LOZ,CT%
3 NEXT LOZ
4 DATA 172,126,58,31
```

program. If you don't, the only thing you can do is transfer them from one to the other and back.

A HELPFUL PROGRAM

Here's another hint that might make your life easier. The program shown in Listing 1 makes the F6 key on the Model 100/102 print the amount of free memory space available and makes the F7 key print the RAM filenames, while you're on-line.

Once you have this program in your Model 100, run it once and it will stay, unless you get a cold start. If that happens, just run the program again to put it back.

Now through this program, you can find out, on-line, how much memory you have left (press F6) and what your RAM filenames are (press F7). I always forget the name I gave a file and have to leave TELCOM, write down the name, and go back on-line. So I wrote this little program to save me the work. □

COMPATIBILITY: Tandy 100/102.

Put Your Modem In Overdrive!

A software approach to 450-baud modem operation for the Tandy 100.

By Bob Scott

Although the internal modem in the Radio Shack Model 100 is designed to operate at 300 baud, with some simple software modifications, you can *push* it to speeds of 450 or even 600 baud. You can use this capability to decrease significantly your connect time with bulletin boards or data services. If you routinely call the CompuServe Information Service (CIS), for example, you may be interested that they support calls at 450 baud, and that there is no additional charge for this service. Thus, you get fifty percent faster communications, cutting your connect time (and costs) by a third.

You can also use this trick to boost M100-to-M100 phone hookups up to speeds of 600 baud. If you're lucky, your local bulletin board (BBS) may even be compatible with this mode of operation.

The technique of pushing 300-baud modems to higher speeds was popular back in the early days of modems and bulletin boards. Back then, *dumb* (non-microprocessor controlled) modems were the rule. Although technologically uninspired, these *boat anchors* had one interesting "feature": if you sent data to them faster (by speeding up the serial port connecting the modem to the computer), they would send the data out the phone line faster. Hobbyists frequently used this technique to increase data rates to 450 or 600 baud.

Two technological complications brought a halt to this practice. First, the advent of "smart" 300-baud modems prevented most people from even trying it. Since the microprocessor in a smart modem must constantly scan the transmitted data for commands, it must know the baud rate being used and read the data as it passes. None of the smart modems were programmed to read data at 450 or 600 baud, so if you tried one at oddball speeds, all you would get was a confused modem.

Second, 1200-baud modems became relatively cheap around this time. Consequently, everybody changed to 1200 baud, and the technique of pushing 300-baud mo-

```
10 REM FSTMDM.BA copyright 1988 by G.R.  
Scott  
20 IF (PEEK(64268)=216) AND (PEEK(64269)  
=245) THEN PRINT "Removing 450 bps":POKE  
64268,49:POKE 64269,66:CLEAR 256,MAXRAM:  
MENU  
30 PRINT "Installing 450 bps":POKE 64269  
,245:POKE 64268,216  
40 CLEAR 256,MAXRAM-25  
50 FOR I=62936 TO 62955:READ XZ:POKE I,X  
Z:NEXT I  
60 MENU  
70 DATA 243,245,62,85,211,188,62,65,211,  
189,62  
80 DATA 195,211,184,205,41,66,241,251,20  
1
```

The listing for FSTMDM.BA, giving your Tandy 100/102 the capability of 450 baud.

demns became more an item of curiosity than one of practical importance—until the M100 cropped up.

MODEMBASICS

To explain how this little trick is possible on the M100, let's first explore the operation of the internal modem. The transmission and reception of modem signals require only three integrated circuits (IC's). First, these chips must take a parallel eight-bit data word and convert it to serial format. That is, the data word is converted from eight bits flowing over eight wires simultaneously to eight bits proceeding one after another on one wire. Next, the voltage level of this orderly procession of ones and zeros (called a serial data stream) is changed from the TTL (transistor to transistor) voltage used for data inside the computer to the voltage needed for audio tones transmitted over the telephone lines.

THE M100's MC14412 ONE-CHIP MODEM

The MC14412 modem, designated M31 in the Model 100, converts the serial binary data described above into an alternating pattern of high and low tones. For example, if you have your M100's modem set to ORIGINATE mode and a 1 comes up in the data stream to be transmitted, the MC14412 generates an audio tone of 1270 Hertz, a high frequency. Conversely, when a 0 comes up the stream, the chip coughs up a 1070 Hz tone, a low frequency. While doing this, the IC must also listen for the distant computer to send ones and zeros using the separate tone pair 2225 and 2025 Hz. This simple technique is called *Frequency Shift Keying* (FSK). Data transfer rates above 300 baud generally use schemes more complex than FSK to extract more usable bandwidth from the phone lines (for a more detailed explanation of these schemes, see sidebar).

Notice that the modem chip makes no demand on the speed at which you send data to it; the faster you pump in the bits, the faster they go out over the phone line. (The similarity to the old boat anchor stand-alone modems is not accidental. To the M100, this single chip looks just like an external dumb modem, functionally duplicating a printed circuit board full of discrete components.)

You're probably wondering why we don't just run at 19,200 baud, if speeding up a modem is this simple. The answer: 600 baud is the practical upper limit of transmission using FSK. The reasons for this can get complex. Essentially the telephone channel runs out of room (bandwidth) when the modem carrier switches too rapidly between the two designated ("one" and "zero") frequencies. Thus, the receiving end can become confused about when the transmitter switches from, say, the upper tone to the lower. And since the serial data transmission scheme requires precise timing to decide which bit is being sent at a given instant, errors begin to creep in.

On the other hand, 300 baud is a pretty conservative rate for FSK modem operation. The factor of two between the design rate and the theoretical maximum rate allows increased tolerance to noise over poor phone connections. If your phone connection is above the bare minimum—which it generally is—you can use some of this margin to cut your transmission time.

UNIVERSAL ASYNCHRONOUS RECEIVER TRANSMITTER

The common computer device called a Universal Asynchronous Receiver Transmitter, the 1M6402 UART—designated M22 in the M100—functions as a precisely timed dicing act. It takes an eight-bit parallel word and shoves it out one bit at a time over a single wire. A similar device at the distant end of the wire (or phone line in our case) operates in synchronization with the transmitting UART and reassembles the eight serial bits into a parallel form

the receiving computer can use. The exact mechanism for this process is not of interest here (refer to a good hardware book such as *Inside the Model 100* by Oppedahl for a more thorough explanation). What is of interest is that this chip determines the rate at which the modem sends. If you speed up the UART, you speed up the modem.

But the speed of the UART is in turn determined by a clock signal applied to one of its pins. The frequency of this clock signal is specified as sixteen times the baud rate desired for transmission and reception; for example, for 300-baud operation, the M100 applies a 4800 Hz (300 times 16) square wave signal to the UART clock pin.

THE PROGRAMMABLE INPUT OUTPUT CHIP

M25, the 81C55 PIO, is the Programmable Input Output chip (PIO) in the M100. This complex device performs numerous tasks, including driving the printer, driving the display, and most significantly, providing the clock signal to the 1M6402 UART chip.

A programmable timer in the PIO can be set to produce a square wave whose frequency is an exact fraction of a master clock signal applied to an input pin on the PIO. Therefore, you can program the PIO divisor, and set its output frequency to the UART and hence the modem baud rate.

TELCOM sets the PIO divisor for 300-baud communication when entering terminal mode. So changing the speed of the modem requires that you call a machine language routine from within TELCOM to reprogram the PIO for the desired rate. First, in preparation for programming the PIO, let's see how the PIO divisor rates are computed and loaded.

DIVISOR COMPUTATION

The PIO in the M100 is supplied with a clock signal from the Central Processing Unit (CPU) at 2.4576 MHz. You can load a 14-bit number into the PIO to divide this frequency by any integer value from 1 to 16,383. (This works out to baud rates from 9 to 153,600.)

The fourteen bit-divisor is loaded as a pair of eight-bit bytes to the output ports 188 and 189 (decimal) with the low-order byte going to port 188. The two most significant bits of the high-order byte specify the timer operation mode. For our purposes, the values of these two high order bits will always be 01, which sets the timer to square wave mode.

You know that the input to the PIO is 2.4576 MHz and that the input to the UART must be sixteen times the desired output speed. So, given the baud rate, you can write the following formula for the UART divisor:

$$D = 2457600 / (B * 16)$$

Where: D = divisor, and B = baud rate

Plugging in a baud rate of 450, you can see that the PIO divisor needed is 341.33. Since only an integer divisor is permitted, you would use the value of 341 (this rounding

*If you speed up
the UART,
you speed up
the modem.*

TELECOMMUNICATIONS

causes only a 0.1 percent error in the resulting baud rate).

To compute the values to load into the PIO ports, you must express the divisor in hexadecimal notation, so 341 decimal converts to 0155h (hexadecimal). With the number in hex format, you can easily divide it into upper and lower bytes. The lower byte is just the last two digits, or 55h. Converting this hex digit back to decimal gives a value of 85 to output to port 188.

Similarly, the upper byte is 01h. But before you can send it to port 189, to specify the timer operation as I mentioned above, you need to set its two most significant bits to (coincidentally) 01 *binary*. To illustrate, first let's write the divisor value we have (01h) in binary: 01 hex = 0000 0001 binary. Then let's set the upper two bits to 01: 0000 0001 -> 0100 0001 binary. And finally convert the result back to hex: 0100 0001 binary = 41 hex. The upper divisor byte is thus 41h (65 decimal); this is the value you'll need to send to port 189.

If you wade through the math for the 600 baud case, you'll find that the decimal values for ports 188 and 189 are 0 and 65 (decimal), respectively.

In addition to the divisor, you have to send a value of 195 to port 184. This value *enables* (turns on) the PIO clock line to the UART, assuring that it starts operation after the divisor is loaded.

THE PROGRAM

The program *FSTMMD* (see Listing 1) loads and removes a machine language routine, which accomplishes the dirty work covered in the paragraphs above. Let's look at it more closely.

Line 20 is a test to see if the 450-baud machine language routine is already loaded. If so, the program removes it from memory and returns the user to the main menu.

Line 30 assigns a function to the F6 function key. The function keys F6 and F7 are unassigned in TERM mode under TELCOM, but the M100's software designer provided for their use. When pressed, these keys cause the computer to jump to an address specified by a special pair of locations in RAM (called a *vector*). The F6 key vector is stored in locations 64268 and 64269 (two bytes are needed to store the 16-bit address). Normally, these bytes just point to a RETURN instruction in ROM, so pushing F6 effectively does nothing. Line 30's POKE's, however, set this vector to point to the space where the machine language routine to change the PIO divisor is located. (Line 20 looks to see how this vector is set to decide whether to install or deinstall the baud rate routine. If it deinstalls it, it sets the F6 vector to activate a clear screen routine, which is a bit more useful than a RETURN.)

Line 40 reserves twenty-five bytes of high memory for use in line 50.

TELECOMMUNICATIONS SIDEBAR

Modem Protocols

The article *Put Your Modem In Overdrive!* briefly describes the operation of the Bell 103 standard 300 bps modem. In that discussion, the claim is made that 600 baud is about the fastest that data can be transmitted over a telephone line. If that's so, how can manufacturers sell 1200/2400/9600-baud modems? The answer is that they can't! Your 1200-baud modem is really a 1200-bps (bits per second) modem, which runs at (surprise) 600 baud. As you may have guessed, there is a subtle but important difference between bit rates and baud rates.

Bits per second (bps) is easy; it means just what it implies. For example, 1200 bps means that 1200 data bits flow through the modem per second. Baud, on the other hand, gets into some deep water. The old definition of baud rate was *number of voltage (or signal) changes per second*. For example, our FSK 300-bps modem shifts its tone between the *one* and *zero* values of 1270 Hz and 1070 Hz at a rate of 300 times a second. These

shifts in the frequency of the tone are the *signal changes* alluded to in the definition. Three hundred shifts per second means you are operating at 300 baud.

As discussed in the article, each tone shift indicates one bit of data, so there you are transmitting also at 300 bps. In the case in the article, baud rate equals bit rate, and that is where the confusion got started. Since 300 bps modems were in use for such a long time, and since they were also 300 baud modems, *baud* became the *de facto* expression for modem data transfer rates, correct or not.

Now, suppose you can find some way to send more than one bit per baud? For example, if you could send two bits per baud, and ran your modem at 600 baud, you'd achieve a data rate of 1200 bps. As you'll see, that is exactly how a 1200 bps modem operates.

First however, let's get to the current definition of *baud*. A new definition was created to correct another bit of confusion as I demonstrated above

with the phrase *bits per baud* and *600 baud*. Notice here that I used *baud* to mean both a *thing* you could put bits in, and a speed. Not good. Using current terminology, the *thing* you are sending is a called a *symbol*. So the baud rate is the number of symbols per second. Again, a symbol may represent more than one bit, and generally does. In Bell 103 transmissions (300 bps, 300 baud), one symbol is one bit. Operating at 1200 bps under the Bell 212A standard (1200 bps, 600 baud) uses one symbol to convey two bits. Similarly, 2400 bps gives four bits per symbol, and it also runs at 600 symbols per second, or 600 baud.

Now, how do they do that? Let's take the 1200 bps modem as an example. Rather than use an FSK signal, which switches between two tones to convey data, the 1200 bps modem uses only a single carrier tone (1200 Hz for originate mode). The phase of this signal is varied by one of four angles (0, 90, 180, or 270 degrees) to convey information. If the modem

Line 50 loads the actual machine code (stored as DATA statements) into high memory—starting at address 63936—then exits. The 20 bytes of machine code represent the following assembly language instructions:

```
DI
PUSH PSW
MVI A,85
OUT 188
MVI A,65
OUT 189
MVI A,195
OUT 184
CALL 16937
POP PSW
EI
RET
```

The first two lines of this routine disable the interrupts and store the current state of the Model 100's 80C85 processor on the stack. The next six lines move the divisor bytes and the enabling value into the processor's accumulator and writes each to the correct port.

The CALL statement passes to control a M100 system ROM routine which generates an audible "beep." Although not strictly needed, this assures you that something happens when you press F6.

Finally, the last three lines restore the processor state to

its initial value, enable interrupts, and return control to TELCOM.

OPERATION

Before you try this program out, you'll need somebody to communicate with. If you are a CompuServe subscriber, you can use the GO PHONES command to locate the 450-baud access number nearest you. Having done this, write the number down or store it in your ADRS.D0 file. Be sure NOT to put it in a log-in macro; just terminate the number with <>, so the computer doesn't hang up after dialing.

Type in the program in Listing 1 and save it as FSTMDM.BA.

Pay particular attention to the data statements (lines 70 and 80). If you type in a bogus value there, you could be off on a one-way trip to January 1, 1900 (cold start).

FSTMDM clears high memory, so you should remove any special machine language programs you may have stored there. As a precaution, you should also store any valuable files to disk or tape the first time you run FSTMDM, in case you've made a typing error, or the program doesn't agree with your machine.

RUNNING THE PROGRAM

With that done, you're ready to run the program. From

sees, for example, that the next two bits to be transmitted are 00, it shifts the phase of the carrier to 90 degrees from wherever it currently is. This phase angle change is one symbol, but it conveys to the distant modem two bits (00). This scheme is called QPSK, or quadrature phase shift keying.

To send data faster, you could add more valid phase angles to the four I've mentioned. The problem with this approach is that it becomes increasingly difficult to determine which phase angle is being transmitted as you crowd in more valid points. Imagine that the phase angles are ticks on a clock dial. As you add points, it becomes difficult to tell exactly which point the hand (signal) is pointing at. Noise has the effect of fattening the hand, making the problem even more difficult.

Suppose, however, that the hand on your clock could change length, as well as angular position. With the whole surface of the clock face open to you, not just the rim, you could pick (say) 16 points sufficiently far apart to be easy to distinguish even

under moderate noise. In practice, that is exactly how 2400 bps (and faster) modems operate. The length of the hand is changed by varying the amplitude (loudness or strength) of the carrier as well as its angular position. The resulting constellation of points on the clock face allows us to encode 4 bits in one symbol; run at 600 baud (symbols per second) and voila, 2400 bps.

In all the previous discussions, I have assumed that two modems were sharing the phone lines, each with an equal rate data channel to the other. Doing this obviously requires splitting the available bandwidth (and data rate) in half. Actually the situation is somewhat worse, since some of the bandwidth must also be left empty to act as a guardband between the two carriers.

Relatively few modem transactions use this full duplex capability. A typical case is a hunt-and-peck typist asking a (fast) central computer to dump a large file to him. In this case, a 75-bps outgoing circuit could handle the typing speed of the human. The bandwidth thus freed up

could be used to download data faster from the central computer. Indeed, some modems have been constructed with, for example, a 300 bps channel in one direction and a 1200 bps channel in the other.

The 9600 bps modems use a variation of this technique, called pseudo full duplex. Only one 9600 bps forward channel exists, along with a much slower reverse channel. The modems at each end then swap control of the fast forward channel as needed, signaling their need to transmit over the reverse channel.

If 9600 is not fast enough for you, the current state of the art modems not only run at 9600 bps, but also perform data compression on the data flowing through them. For example, the string "1234444445" might be transmitted as "1236*45", saving some time. The receiving modem would know that "6*4" was to be expanded to "444444" before passing it on to the receiving computer. Using such schemes, effective data rates of 19,200 bps are possible over dial up lines. □

TELECOMMUNICATIONS

the main menu, place the cursor over *FSTMMDM.BA* and press *ENTER*. You should see the legend *Installing 450 bps...* Then you will return to the main menu. Next, enter *TELCOM* and dial the 450-baud number you found earlier. If you are dialing the number manually, don't forget to terminate the string with a pair of angle brackets, <>.

When the remote system answers, indicated by the *TELCOM* label line changing to the *TERM* mode values (*Prev*, *Up*, etc.), press *F6* BEFORE typing ANYTHING else. You should hear a "beep" indicating that you are in 450-bps mode; you can then log in normally and enjoy the speedup.

The prohibition against typing anything before pressing *F6* is also the reason that a log-in macro is not allowed. In either case the data would be transmitted at 300 bps and the distant end would lock in at that speed, preventing a shift to 450 bps. Obviously, this prohibition applies only to systems that do automatic, one-time, baud rate detection (like CompuServe). If you are calling a manually operated computer (like another M100) or one that provides for on-the-fly baud rate changes (like some old RCP/M systems) you can hit *F6* anytime you like in your session; just arrange for the distant computer to switch baud rates.

After you finish your terminal session, you can remove the *FSTMMDM* driver by again executing the program from the main menu. This time you'll see the legend *Removing 450 bps...* When you're returned to the menu, you can delete *FSTMMDM.BA* if you like. Note that leaving the 450-bps driver installed between uses will cause a problem only if you run a program that resets high memory (like *FLOPPY.CO*, *TS-DOS*, etc.). If you don't use any such programs, you can leave the driver installed and delete *FSTMMDM.BA*, reloading it only if you need to deinstall the driver in the future.

As mentioned previously, the *F6* key will be programmed to clear the screen when *FSTMMDM* deinstalls. If you forget whether the program is installed or not, just enter *TERM* mode and press *F6*. If you get a "beep," the program is installed; if you get a clear screen, it isn't.

MODIFICATIONS AND ENHANCEMENTS

The purpose of this article has been to present the theory of pushing Bell 103 modems and give you a little practical experience in the process. Although *FSTMMDM* is useful as is, you may wish to explore several modifications on your own:

Different speed: One obvious change is to try 600 bps operation (if you can find someone to talk to). To do this, change the value 85 in line 70 to 0. Using the formula outlined earlier, you can compute and load any other baud rate you may want to try.

Hardware Modifications: The modem chip in the M100 is currently wired for optimum operation in the 0 to 300 bps range. The performance may be improved slightly by grounding the "Rx Rate" pin on the chip (pin 6). (It is

currently tied to Vcc, which optimizes the demodulator for 300 bps; ground it to select the 600 bps mode.)

Another option would be to run this pin to a switch to allow you to select the baud rate range, or tie it to an unused output port in the M100 (such as port 9 or port 8F) to allow the switching to be done by software.

User Interface: You may view the lack of log-in macro capabilities as a serious problem. If so, you may wish to experiment with conducting the log-on process under a *BASIC* program, then switching to *TELCOM* by using ROM calls. Describing this process in detail is beyond the scope of this article, but one approach would be to *OPEN* the modem as a file (after dialing the phone) and then using *BASIC*'s *OUT* command to reprogram the baud rate before sending the log-on macro (using *PRINT#* statements). You'll then have to jump to the *TELCOM TERM* routines in ROM. Depending on the *TELCOM* entry point you use, the baud rate may get set back to 300 again, so you'll either have to dodge this by picking a clever entry point, or fix the problem once you're in *TELCOM*.

Another option is to modify a stand-alone communications program such as *XTEL* or *XMDPW5* (the latter available on CompuServe's M100 SIG) to do the baud rate switching and log-in dirty work. Since both of these programs support *XMODEM* transfers, the speed boost could be quite useful for protocol transfers.

I've been using *FSTMMDM* for several weeks without problems. Some users have reported increased noise problems at 450 baud, but this is not unexpected. If you have a noisy line to a computer or

service you're communicating with, you should switch back to 300 baud.

If you implement any of the modifications listed above, particularly those dealing with optimizing the modem for higher speed, let us know your results. Remember, the time you save is your own! □

EDITOR'S NOTE: *FSTMMDM* worked flawlessly on our two Model 100's connected directly via their beige modem cables (a handy way to swap files with a friend, incidentally). At 600 baud, however, *FSTMMDM* failed.

FSTMMDM's author explained that direct connection might cause an impedance mismatch, which would not occur over telephone lines. Also, we didn't do the 600 bps hardware optimization technique mentioned in the article. That might have done the trick. But *FSTMMDM* is mainly for saving money on CompuServe. With no 600 bps CompuServe nodes, it seems pointless to go to the trouble, unless you have some special personal uses in mind.

A TIP: Some programs already use *F6* in *TELCOM* (e.g., *PG Design's MENU.BA*). You can install *FSTMMDM* on *F7* instead by changing the *POKE* addresses 64268 and 64269 to 64270 and 64271, respectively. -MN

All The Power
You'll Ever Need
Is Sitting Right
In Your Lap.



Traveling Software. A Powerful



BOOSTER PAK

Five Programs On One Chip.

Five applications for the Tandy 100/102/200, and the NEC PC-8201/8300 that occupy only one file on your computer. Programs included are: T-Word—a laptop Word Processor with disk drive support; ROM-View 80—an 80-column display that lets you view 60 characters and includes scrolling; T-Base—lets you create true Relational Databases; IDEA!—a flexible organizer with an outline format; and Portable Disk Drive Support—so you don't have to store TS-DOS in your computer.

**THE ULTIMATE ROM II . . . WAS \$229.95
NOW ONLY \$199.00***

NOTE: Tandy 200 version includes TS-DOS instead of ROM-View 80.



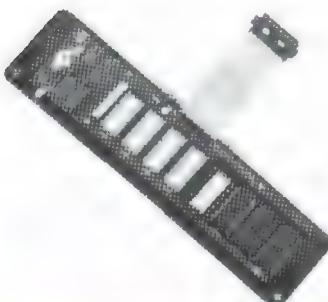
THE ULTIMATE ROM II

Add Up to 256K of ROM Software to Your Laptop.

The 8-ROM EXPANSION PAK gives you 8 ROM sockets to plug-in your favorite ROM software. This slim-designed ROM pack measures only 1" thick and 2½" wide. Attaches directly under the Tandy 100/102/200 or NEC PC-8201/8300. Only one connection is required to the existing ROM socket. Buy the 8-ROM EXPANSION PAK with either a four-chip set of SARDINE or Traveling Software's TS-DOS.

What is really amazing is that switching from one ROM software chip to another is done all by software—absolutely no mechanical switches!

BONUS! With each 8-ROM EXPANSION PAK w/SARDINE PLUS purchase, get TS-DOS in a ROM FREE.



8-ROM EXPANSION PAK

Add 2 Megabytes of Memory to Your Tandy 100/102.

Just snap the BOOSTER PAK onto the bottom of your Tandy 100/102 and plug in two cables. That's all it takes. And you can add up to 2 megabytes of RAM or ROM or a combination of both to your Tandy 100/102. And since BOOSTER PAK is an open system, you can customize it as you go. Add more RAM or ROM software as you need it. BOOSTER PAK comes with: 136K of RAM memory, 64K of ROM software, 16 socketed slots for 32K RAM and/or ROM chips and X-TEL Communication Software. It also has provisions for a battery pak, built-in modem and TS-DOS disk software built-in. It even includes a fast action Asteroids game!

BOOSTER PAK . . . \$429.00

LIMITED TIME SPECIAL: Save \$30.00 on IBM or Macintosh BOOSTER LINK software with BOOSTER PAK purchase.

8-ROM EXPANSION PAK w/SARDINE PLUS . . . \$299.00	8-ROM EXPANSION PAK w/TS-DOS in a ROM chip . . . \$169.95
--	--

NOTE: If you already own a SARDINE ROM, you can upgrade it for an 8-ROM PAK for just \$129.00. The SARDINE disk version can be upgraded for just \$198.00. Call (800) 343-5080 for details.

***Special! Order Now
(limited time offer).**

Connection For Your Tandy 100.



SARDINE

Your Laptop Dictionary & Spelling Checker.

Sardine is able to look up a single word in seconds. Or check a 25K document in less than three minutes. It also lets you create your own auxiliary dictionary of terms, words, names and abbreviations. Compatible with the Tandy 100/102/200 and NEC PC-8201/8300 laptop computers. Requires 16K RAM and a Tandy/Purple Computing disk drive. ROM version also includes

T-Word Word Processing and text formatting.

SARDINE Disk \$99.95
SARDINE ROM WAS \$109.95
NOW ONLY \$119.95*



TS-DOS/TS-RANDOM

TS-DOS—The Traveling Software Disk Operating System

TS-DOS is the complete operating system for Tandy and Purple Computing portable 3½" disk drives. With TS-DOS you can list files both on disk and in RAM, save to disks, load into RAM, kill and rename files. Simply by pressing a function key. With its unique "tag" feature you can load, save or kill several files at once. BASIC programming and disk access included.

TS-RANDOM—Your Rapid Access to Many Laptop Files.

For the Tandy or Purple Computing 100K disk drives. TS-RANDOM retrieves information faster than sequential access methods. Supports up to eight files for simultaneous input and output. Even includes special utilities for quick copying files and recovering erased or damaged disk files. Basic programming and disk access are also included.

TS-DOS Disk (all drives) \$69.95
TS-DOS ROM (all drives) \$99.95
TS-RANDOM Disk (TDD #1 only) \$89.95
TS-RANDOM ROM WAS \$140.95
(TDD #1 only) NOW ONLY \$119.95*



MAC-DOS II

Connects Your Mac to Your Laptop or Tandy/Purple Computing Portable Disk Drive.

MAC-DOS II gets your Mac and laptop "talking" by the connection of our three-connector cable. It lets you read, edit and print files created with your laptop as easily as

regular Macintosh files. Transfers files between your Tandy M100/102/200 or NEC PC-8201/8300 laptop and any version of the Macintosh at speeds up to 19,200 baud instantly. Also includes a Tandy disk drive adapter for optional direct disk access.

MAC-DOS II with cable \$129.95



LAP-DOS II

Connects Your IBM Compatible Desktop to a Tandy 100/102/200, NEC PC-8201/8300 or Tandy/Purple Computing Disk Drive.

LAP-DOS II lets your IBM or compatible "talk" directly to your laptop by the connection of our specially designed three-connector cable. Links Tandy and NEC with all IBM or compatibles including PC, XT, AT and the new PS/2 series. Transfers files at speeds up to 19,200 baud instantly. Also includes a Tandy disk drive adapter for optional direct disk access.

LAP-DOS II with cable \$129.95

ORDER
TOLL FREE U.S.
1-800-343-8080
in Washington State
206-483-8088
Visa, MC, AMX
Accepted

POWERCELL

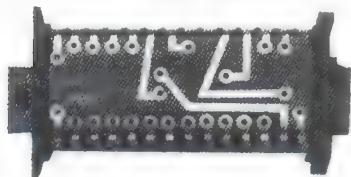
Power Your Disk Drive or Laptop.

Powercell is the lightweight and convenient way to power your disk drive or laptop simultaneously. A performance far superior to "quick drop" Ni-cad batteries (up to 40 hours of power!). For use with portable disk drives and laptop computers. Including Tandy 100/102/200 and NEC PC-8201/8300.
POWERCELL \$79.95

CUSTOM SERVICES

We Convert Your Program Into a Plug-in Rom Chip.

Now you can have your own programs burned onto an EPROM so they will work just like the built-in ROM software already in your TANDY 100/102/200 or NEC 8201/8300. It's the ideal way to free-up your RAM memory for data storage and also make your programs copy protected. Our patented Flexible Circuit Board allows you to change your programs and to have your EPROM re-burned at substantially lower prices. Overnight service ensures that we can meet your schedule. Our service is guaranteed or your money back. Quantity pricing as low as \$41.00 each. No minimum quantity. Call for your free ROM information kit.



**ORDER
TOLL FREE U.S.
1-800-343-8080
in Washington State
206-483-8088
Visa, MC, AMX
Accepted**

BOOSTER LINK

Makes Your Desktop PC Into a Disk Drive For Your Laptop Computer.

BOOSTER LINK allows you to transfer files between your desktop computer and your Tandy 100/102/200 or NEC PC-8201/8300 using a special three-connector cable and TS-DOS or any other disk operating system. It allows TS-DOS to load, save, rename and kill files directly. If you have a BOOSTER PAK or the ROM version of TS-DOS, you can also create and move from subdirectory to subdirectory with the push of a button. BOOSTER LINK comes with a cable and is available for the IBM PC, XT, AT or compatibles and all models of the Apple Macintosh.

BOOSTER LINK MAC/IBM

with cable \$99.95

BONUS! BOOSTER PAK owners save \$30.00
(limited time offer)

NOTE: BOOSTER LINK requires disk drive software to operate!

ROM2/CLEASEAU ASSEMBLER

Three Programs on One Chip.

Cleaseau TEXT Editor—increases the Word Processing power of your built-in TEXT program. Append to a paste buffer, search and replace, insert, overwrite, and more; Cleaseau Basic Inspector—shortens programming time by helping you find the error causing statement in a line; ROM2 Macro Assembler and Symbolic 8085 Debugger—assembles 300 lines per minute, allows you to simulate 1000 instructions per second, uses the complete 8085 instruction set, and more.

ROM2/CLEASEAU ASSEMBLER . . . \$99.95

When ordering, please match your computer model with the appropriate order number listed in the following chart. This number will help us expedite your order. Thank you.

Product Name	Tandy 100	Tandy 102	Tandy 200	NEC	IBMs & compatibles	Macintosh
ULTIMATE ROM II	RS1-UR2	RS1-UR2	RS3-UR2	NE1-UR2		
SARDINE Disk	RS1-SD1	RS1-SD1	RS3-SD1	NE1-SD1		
SARDINE ROM Chip	RS1-SD2	RS1-SD2	RS3-SD2	NE1-SD2		
SARDINE 4 ROM Set for Booster Pak	RS1-SD3	RS1-SD3				
MAC-DOS II	AP1-MD1	AP1-MD1	AP1-MD1	AP1-MD1	AP1-MD1	
LAP-DOS II	PC1-LD1	PC1-LD1	PC1-LD1	PC1-LPD1		PC1-LD1
POWERCELL	HW1-PP1	HW1-PP1	HW1-PP1	HW1-PP1		
8-ROM EXPANSION PAK w/SARDINE PLUS w/TS-DOS	RS1-SD4 RS1-TS3	RS1-SD6 RS1-TS4	RS3-SD3 RS3-TS3	NE1-SD3 NE1-TS3		
TS-DOS Disk	RS1-TS1	RS1-TS1	RS3-TS1	NE1-TS1		
TS-DOS ROM Chip	RS1-TS2	RS1-TS2	RS3-TS2	NE1-TS2		
ROM2/CLEASEAU ASSEMBLER	RS1-CL1	RS1-CL1	RS3-CL1	NE1-CL1		
BOOSTER PAK Options: 32K CMOS RAM (\$20) 6 Slot RAM Expansion Board (\$69) 256K RAM Expansion Modules (\$159) Internal Nicad Battery Pak (\$69) IBM PC Booster Link w/cable (\$69.95)* Mac Booster Link w/cable (\$69.95)* Sardine Plus 4 Chip Set (\$194.95)	HW1-BP1 HW1-BP3 HW1-BP4 HW1-BP5 HW1-BP6 PC1-BL1 AP1-BL1 RS1-SD3	HW1-BP2 HW1-BP3 HW1-BP4 HW1-BP5 HW1-BP6 PC1-BL1 AP1-BL1 RS1-SD3				PC1-BL1 AP1-BL1
BOOSTER LINK (Mac)	AP1-BL1	AP1-BL1	AP1-BL1	AP1-BL1	AP1-BL1	
BOOSTER LINK (IBM)	PC1-BL1	PC1-BL1	PC1-BL1	PC1-BL1	PC1-BL1	

*BOOSTER PAK owners and purchasers save \$30.00. Only \$69.95. Limited time offer.

Traveling Software

The Trail To A Working Hard Drive!

A review of the CMS 20MB hard drive for the Tandy 1400 LT.

by Stephen R. Lankton

This is a story with a happy ending. But the road to this ending was rife with frustration and confusion. A good product put out by a good company, for me, turned into a headache of bureaucratic proportions. But thinking I had lost a good product, I discovered that, out of experience, people buying this product for their Tandy 1400LT's have benefited.

CMS Enhancements, Inc., now manufactures a twenty-megabyte hard drive, called the LiteDrive II, designed to work in a wide range of laptops, including the Tandy 1400LT. Quoted at \$1199, it includes a hard drive, cable, controller board, manual, and three utility programs. You can get it mail order for less.

THE PROMISE

The drive promises 75-millisecond access speed, user-adjustable shutdown intervals, password protection, and the ability to withstand up to 10 G's (ten times the force of gravity) when in use and, when idle, up to 70 G's. CMS advertises that the drive will drain, on the average, less than 25 percent of the 1400's four-hour battery life. I saw the drive as a way to end the woes of switching floppies.

I am writing this on the drive now. But buyer and dealer beware. CMS was not fully aware of the 1400's idiosyncrasies, leaving you with a good chance of losing some of the LT's extra RAM or, worse, incomplete formatting of the hard disk. The technical expert at CMS told me that users always experience temporary inconveniences during upgrades. This drive, he said, is not 100 percent (software) compatible with the 1400. In their defense, the problem is only temporary. But until mid-fall plenty of buyers won't get full use of their machines without hassle.

DEALING WITH THE DISTRIBUTOR

You order the drive through a dealer. It costs dealers about \$655, and you will be asked to pay between \$750 and \$1199. Radio Shack offers this drive for \$1199 in the fall catalog, providing Radio Shack warranty and technical support, if customers have a technician install it.

Dealers will install the drive, and only dealers can obtain support from CMS for you. However, most dealers wish to help in every way if they intend to keep their customers. Nonetheless, this is a potential communications problem: you have to reach the dealer, the dealer has to get the problem straight, the dealer has to reach CMS customer support, and CMS in turn needs to understand the problem. After solving it, the chain has to repeat in reverse. And the loop can take several hours or lapse into the next day or beginning of the next week.

INSTALLING THE DRIVE: A FEW PROBLEMS

The drive is well-made. The quality of workmanship is high, apparent as you first hold the drive. It is nestled in foam rubber beside the HD controller board, which makes the drive special for the Tandy system. It comes with a utility disk (with three programs), connector cable, and a thirty-page, photocopied-and-stapled manual. Begin with the documentation. The manual is generally clear, systematic, and at times tastefully humorous.

In brief, to install the drive you must remove the ten screws holding the bottom, and two screws holding the LED screen, to remove these items. Unclip several snap-on cables, the keyboard, a couple more screws, and viola! You have access to the screws holding drive B.

Then you can remove the floppy drive with three screws and replace it with the hard drive. Needle nose pliers are best for tightening the fiberglass nuts provided to secure the hard drive.

Next, connect the drive cable and the battery cables. Attaching the battery cable requires some work to remove the existing clip connection and replace it with the one on the hard drive, a procedure that should have been more thoroughly covered in the manual. The manual doesn't mention the smaller clip you must remove, which holds the plug in place. The omission suggests that some of the special differences in the 1400 were not given attention.

With above accomplished, reverse the procedure until the 1400 is back together. Because of the problems we

HARDWARE REVIEW

encountered with the CMS drive and the 1400, the dealer and I went through this process probably ten times in all, though now that I know the process, I can say with confidence it is not difficult.

Of special concern, however, is disconnecting the plug holding wires to the power supply. The manual warns you not to yank it by the wires, but it should also provide a sketch of how you should place a screwdriver in the plug to pop it. Further, the pictures in the manual do not label the parts you are to find anywhere in the process.

For instance, the diagram does not point to the inverted drive B, the power clip on the battery, which must be changed, and the RAM expansion board you must remove, nor did it show labels, increasing initial disassembly anxiety. Also, you must remove two tiny sticker-caps from the power supply anchoring screws. At first I couldn't find these screws and had to reread several pages to see if I had missed something when my inner chassis didn't lift out.

My local dealer tried unsuccessfully for several hours to remove the two flat-head bolts holding the screen at either side in one customer's screen. I discovered how the movement of the screen strains or relaxes the tension on these screws and later had trouble only with one side. Loosen these screws when the screen is open about 5 degrees forward (toward the user's head) of vertical. In that position, the screw sockets are most likely to be aligned with the plastic hole it slides through, so the tension on the screws will be relaxed. The manual never mentions this potential difficulty.

Otherwise, I thought the documentation was clear, for someone like me who has been into computer innards before (as your dealer will be).

MORE PROBLEMS REAR THEIR HEADS

The little omissions in the manual begin to make you wonder how completely CMS investigated Tandy's machine, especially since the manual is otherwise so detailed, down to the screw. The apogee of this doubt emerges when you get to the instruction that tells you to format the hard drive by typing *FORMAT C: /S*. This is the way to format a drive and add the system (to boot up from the disk). But, remember, the 1400 thinks that drive C is an external floppy, even if C is a hard drive. Thus, *FORMAT.COM* supplied with your DOS 3.2 disk formats the hard drive as 720K and not 20 million bytes!

I called my dealer and explained that the drive won't format to 20 megabytes with *FORMAT.COM*. CMS told my dealer that it should work and try again. I couldn't see a reason it would work either the first or second time, so I appealed to my dealer again to contact CMS.

The next day, he contacted CMS, who insisted that MS-DOS version 3.3 would work, or PC-DOS 3.3. I mentioned to everyone that I had followed the instructions and paid my money... I did not want to buy a \$120 DOS package too. So the dealer bought one. I used it, and the drive formatted. Everyone is happy. Right?

Wrong. The Tandy 1400LT comes with 768K of RAM, one of the unique features of the machine, which makes it a super value. The RAM disk driver (*RAMDISK.SYS*)

supplied by Tandy is the *only way* to access the extra RAM and the driver won't work with 3.3 DOS. That would be a forgivable oversight, but in addition the *FORMAT.COM* program in DOS 3.3 will format a floppy in a 720K drive only up to 360K. Do they expect all Tandy 1400 owners—who paid \$1199 for the drive—to reboot with the 3.2 DOS just to format floppies or to use the RAM disk?

CMS did not even know that the 1400 had 768K. Thus, CMS had made no provision to get the RAM working.

My dealer was beside himself. We had been at this for three days. One day CMS swore that the docs were right. The next day they swore that DOS 3.3 was needed. The next day they said they can't really help us out if we want the extra RAM—buy it from Tandy or wait for Tandy to release the new DOS. And so on.

I tried a little experiment. When I transferred DOS 3.2 onto the hard drive formatted with 3.3, it worked. The RAM worked, and the formatting of the floppies worked as would be expected. I contacted CMS. They couldn't guarantee that this solution would be stable. They said they had sold well over a hundred to Tandy owners and had no such problem. Come on! Am I to believe over 100 owners bought DOS 3.3, formatted all floppies at 360K (or rebooted with 3.2 for floppy formatting), and allowed their RAM to go from 768K to 640K without complaint? Or should I believe that they all figured out that the manual was wrong and persevered until they formatted with 3.3 *FORMAT.COM* and transferred DOS 3.2 to the drive. I find both possibilities unbelievable.

I returned the drive, and the dealer supported the decision. He concluded that CMS was not ready to sell the drive to Tandy owners.

It was too bad, too. It is a well-made piece of hardware. But, remember, I am writing this on the hard disk.

THE PROBLEMS SOLVED TEMPORARILY AND PERMANENTLY

In the course of writing this review, I spoke with Marymac, the Tandy dealer in Texas, who listened to my difficulties and sought the best solutions for potential buyers. They discovered that *FORMAT.COM* from the Tandy 1000TX DOS 3.2 will format the drive and, being a Tandy version 3.2 DOS, it ought to be fully compatible with the 3.2 purchased with the 1400. Marymac ships the machine to you with that combination of DOS and *FORMAT.COM*. This is the *only place* I know where a novice can buy the 1400 and CMS drive and get a working package. Plus, the technical support at Marymac has the background with Tandy computers to know what to look for. Also, they sell the hard drive at the lowest price: \$750.

But here's more: As a company who listens to their customers, CMS called me on several occasions. They were determined to do their best to fix the problem. Unable to supply the DOS or (at this writing) the *FORMAT.COM* program (the property of Tandy and Microsoft), they are sensitive to their customers' difficulties. Now all new manuals come with a letter explaining the solutions that Marymac and I discovered. These solutions work fine for users who have Tandy's DOS 3.2.

Yet another solution is on the horizon. Tandy is to



The new CMS LiteDrive II hard disk drive and the controller board that makes it work on the Tandy 1400LT.

release new formatting software soon, and maybe a new DOS for the 1400. In the fall catalogs, Tandy lists a 20-megabyte hard drive kit for \$1199, part number 25-3515. I believe it is the very same CMS drive! So you can buy this excellent CMS drive now or wait for Tandy to upgrade.

OVERALL PERFORMANCE

The LiteDrive II is pricey as hard drives go, with Seagate 20-megabyte drives available for less than \$300 and controller boards for desktops for a hundred more. But laptop hard drives aren't cheap, built to withstand movement and use little battery power. At \$750, this CMS hard drive is a good buy.

It can be password protected and a ROM inhibits the boot up waiting for the password, a useful feature on the road. No one at a seminar or in a hotel room will turn it on and snoop or inadvertently destroy data.

The drive's bootup takes about a minute. The 1400's RAM check takes 10 seconds, a diagnostic procedure takes almost twenty more seconds, and the version I have (1.02) asks for the password I installed with the utility software. Since the hard drive has turned itself off from the seven-second default (to save battery power) and must spin back up to speed, when I enter the password, the disk booting takes thirty seconds more.

In my AUTOEXEC.BAT file is the SL program (stop lite) supplied with the utility disk. Earlier versions of this program were RAM resident and allowed users to adjust how long the drive stays on in intervals of 7 seconds before it auto-parks to protect the head from jarring and preserve battery life. The new version of this program, a batch file, can be changed at any time. The batch file version cannot interfere with other programs in the way a resident version might. For CMS to have made this change is another example of their responsiveness.

The ability to switch between word processing, database, telecommunications, and DOS, etc., quickly and easily, means I have the same work-power on the road that I have in the office. The LiteDrive II does not drain the battery much. I get about 3.5 hours of use on an airplane

with the CMS hard drive compared to 4 hours with the two floppies. The hard drive's weight is almost the same as that of the floppy I removed. But I needn't lug around fifteen floppies or wait for them to boot. And with the hard drive, the 1400 is fully compatible with the IBM XT. Norton Utilities SI (measuring device speed) displays the computing speed as 3.4 times faster than the IBM XT, disk speed is 1.7 times faster, and the overall performance index is 2.8 times faster with the CMS hard drive attached.

One sour note, the drive's seek power need is 4.7 watts, so it drains the battery faster than the battery can charge, even if the power adapter is plugged in. You can't just plug it in as a desktop hard drive machine—you must watch battery drain. However, you can use a regulated, 12-volt DC power supply in place of the battery, allowing continuous use of the drive. A 6-ampere regulated power supply from Jameco works fine (although a 2-amp supply would do) with an additional battery clip (\$1) from Radio Shack National Parts. The power supply I use in my office is \$24 but others are available for less. Since discussing this with CMS, I believe they will be producing or marketing one to do this job soon.

Considering my difficulties as an early user of this new product, CMS did well as an ethical and reputable company supporting their product, living up to their fine reputation. The product is terrific at a reasonable price. It performs flawlessly, as well as—or better than—promised. CMS support is now knowledgeable and helpful about the special format and RAM requirements of the 1400 and can assist dealers with customer's problems. Some dealers, like Marymac, can sell it at a discount price, install it, ship the formatting program and support customers. And finally, Tandy, by selling the drive this fall, conveys to me a real confidence about this product over what I have learned in my investigations. It is a must for all serious 1400 users. It squarely places the 1400 as a strong competitor alongside the better known hard-drive laptops like Toshiba, NEC, and others. □

Stephen Lankton, assistant prof. at the University of West Florida, is an author of eleven professional books in psychology.

Manufacturer's Specifications

CMS Enhancements, Inc.
1372 Valencia Avenue
Tustin, CA 92680
(714)259-9555

LiteDrive II, \$1199—CMS No. DLD1400-20; unformatted capacity, 25.6 megabytes; recording method, 2,7 RLL; track-to-track seek time, 15 ms; average track access, 75 ms; data transfer rate, 7.5 Mbits; rotation speed, 2540 RPM; cylinders, 615; 3.5-inch rigid disk; number of heads, 2; tracks per inch, 880; R/W head park cylinder, 680; bit density, 27022 BPI; reliability, 22,000 MTBF, 30 mins MTTR; media life, 10,000 CSS; power on, 6.81 watt; read/write, 4.6 watt; seek, 4.72 watt; idle, 4.58 watt; power save mode, 0.00 watt; auto park after 6 seconds.

The Gold Card:

24-Karat Technology

by Mike Nugget

Dust!

That's how I'd sum up the Gold Card. Naturally, I considered "fantastic," "outstanding," and "revolutionary"—all appropriate but cliché. And "totally gnarly, dude" wouldn't work anywhere east of SoundSight. (That's in, like, California, man.)

So it's "dust." The dust collecting on my RAM banks, ROM's, ROM Safe, disks, drives, and related hardware and software. Beyond occasional disk drive use, I don't need all that paraphernalia. Gold Card has taken its place.

On the surface, SoundSight's Gold Card is an expansion RAM product, the most compact expansion to date. Underneath is a rich vein of powerful features. And deeper still is the raw ore of potential, the chance to realize some of the most cherished items on our *wish lists*. Gold Card technology might be the most important Model 100/102 development in years!

I've had Gold Card units on my Model 100 for many months, starting with beta test version 3.8. This review describes v7.10, along with the ROM Eliminator option, operating on a 32K RAM Model 100.

The Gold Card system attaches to the underside of the computer. The standard package is a small, flat interface unit containing one or two Gold Cards. The cards themselves are plug-in random access memory (RAM) modules in the shape of credit cards. Currently available cards have capacities of 128K, 256K, or 512K each. So a two-card unit can put 1M (one megabyte, or one million bytes) of RAM on your lap today. With 1M cards expected within two months and 2M cards by Christmas, that's a potential of 4M on your Model 100/102.

Gold Card RAM is non-volatile. Each card has its own lithium battery to maintain the memory when the computer is turned off. This takes the hassle out of cold starts. Just keep your DOS and other important programs on the Gold Card, and after a cold start, they're just a BASIC CALL statement away.

MODEL 100 RAM DRIVES

Unlike RAM banks, the entire Gold Card memory is always available to your programs in a form similar to RAM disks. One card is drive A and the other, in a two-card system, is drive B. You get the speed of a hard disk or RAM drive, but since you can easily swap cards in and out, you still keep the swap-ability of floppies. You could keep a mailing list on one card, all your spreadsheets on another, have yet another card for financial programs and

data, and still another for games.

INSTALLATION

The Gold Card looks like its picture in the ads. Light-weight and tiny, it consists of a black plastic interface unit with one or two Gold Cards already mounted and a ROM containing the operating software. The manual includes an illustrated hardware installation guide.

Installation is a snap. Plug in the ROM, plug the interface unit's ribbon cable into the system bus, and press the unit into place. Double-sided *stickum* on the interface binds it tightly to the computer. Mine have taken abuse for months with no hint of letting go.

Now, turn the computer on and enter BASIC. Type CALL 63012'i and press ENTER. The Gold Card installs and initializes, running self tests to verify and format itself. When done, the Gold Card menu is displayed on the screen, and the name GldCrd has been put into the Model 100 directory, so you can run it from the main menu.

GOLD CARD MENUS

Gold Card has three types of menus similar in appearance and operation to the Model 100 main menu. Additionally a function key menu appears on the bottom line to display function key labels (i.e., for loading, saving, renaming files, etc.).

The RAM menu displays your RAM files, the number of free bytes in RAM, and the currently active Gold Card (A or B). Pressing F1 toggles between this menu and the Gold Card file menu.

The Gold Card can contain 191 file names, displayed on nine menu pages with up to 19 files per page. Gold Card memory is not partitioned; only the directory is, to let you group the names of related files together. The menu first comes up showing Page 1 of the files on the currently active card. Pressing a number key (1-9) displays any page you want. Each page also shows which card is active, the free space on that card, the function key labels, and the size (in 0.25K increments) of the file selected by the cursor.

Pressing F4 from any menu calls up the "Utility" menu, with selections for testing the Gold Card hardware and software, initializing cards (like formatting disks), setting GolDOS hooks into BASIC, write protecting a card, and copying one card to the other.

GolDOS

The GolDOS operating system, manages the Gold

Cards, and since it's on ROM, it uses no RAM. Its flexibility allows your operation to be as simple or as complex as you require. *GolDOS* provides a wide range of services.

One service is its menu system. You can load, save, kill, rename, and move both RAM and Gold Card files with function key ease. The *Move* function, in one easy step, copies a file from the source to its destination (RAM to Gold Card or vice versa) then kills the source file. One stipulation: you can't load, save, or move to a file of the same name on the same card or in RAM. You'll get a *File Exists* message. You must first kill the offending destination file or rename either the source or destination file. Fortunately, that's easily done with a few keystrokes. But an option to overwrite the destination file or rename the source file at load/save/move time is definitely #1 on my list of suggested improvements.

You can enter text (.DO) files from the Gold Card file menu by pressing *ENTER* with the cursor over the file's name. The file loads into RAM for editing and is re-saved automatically to the Gold Card on exiting, so you needn't remember or bother to save the edited file. *CUT*, *COPY* and *PASTE* works between RAM and Gold Card files. As with normal RAM files, the size of a file that can be edited is limited by the amount of free RAM. (Note: *GoldText*, a product developed especially for the Gold Card, edits files directly on the card, using no RAM, allowing you to edit files as large as your Gold Card will hold. Look for a review soon.)

GOING DIRECT WITH GOLD CARD BASIC

Another service, Gold Card *BASIC*, lets *BASIC* programs read, write, run, open, close, merge, rename, and kill files on the Gold Card, using standard commands as *LOAD*, *SAVE*, *OPEN*, *PRINT#*, *INPUT#*, *MERGE*, *KILL*, etc. For example, *RUN "A:MYPROG"* will load and run *MYPROG.BA* from drive A. Rather than keep your RAM full of files, just run them directly from the Gold Card. This allows bigger programs. You can even chain, with one program running another. Chaining lets you run very large programs by breaking them into a chain of modules.

Machine language (.CO) files can be handled with *LOADM*, *RUNM* and *SAVEM*.

GOING DIRECT IN TEXT

In *TEXT*, you can load and save text files directly to and from the Gold Card. For example, to load *MYFILE.DO* from drive B, press *F2* (Load) and at the *Load from:* prompt type *B:MYFILE* and press *ENTER*. Save (*F3*) it the same way, as *A:MYFILE* or *B:MYFILE*.

Note that direct operations can load from one card and save to either card. And unlike menu-driven saves/loads, it automatically overwrites like-named destination files.

REALLY GETTING DOWN WITH EXTENDED SERVICE CALLS

Extended service calls really unlock the power of the Gold Card. Appending parameters to the *CALL 63012* statement (e.g., *CALL 63012'i* in the installation process), lets *BASIC* perform the functions above, plus it can install, initialize, or remove Gold Card, verify, test memory, display the Gold Card menu, copy one card to another, set the currently active drive, return the size of a card and its free space, find files on the cards, display any directory page and get the file selection, and much more.

Extended service calls offer advantages with machine language (.CO) programs. Whereas normal *LOADM* and *RUNM* statements destroy the current *BASIC* variable list, their extended equivalents do not, making it possible to load and run a .CO file in the middle of a running *BASIC* program without losing the values of existing variables.

SECTOR ACCESS!

Most powerful of all, extended service calls allow operation at the sector level. *BASIC* programs can read and write physical sectors on the Gold Card, test whether a sector is in use, mark a sector as free or in use, find the next free sector, find the first sector for a directory entry, update a directory entry.

This is the "raw ore." With direct access to any byte on the card, fantastic possibilities become closer to reality. Large random access databases are now possible, even in *BASIC*. The largest mailing list could be accommodated.

Editing massive text files is not only possible, it's already here! I've been editing a 48K text file which, if it grows to 100K or more, will be no problem, thanks to SoundSight's *GoldText* ROM. What's more, I can do it without disturbing any existing files in my Model 100 RAM. Should I decide to transfer the file to my 1400LT (MS-DOS), I can send it out the RS-232C port via a *SAVE* to *COM*:. I can upload it to a BBS, using *XMDPW6*, the newest *XMODEM* telecommunications program on CompuServe's Model



A Portable prospector finds gold in them thar New Hampshire Hills. He disappeared shortly thereafter.

100 Forum. I can also download any size file up to the limit of my Gold Card memory.

Most existing *BASIC* programs that work with RAM files also work with Gold Cards just by turning on the Gold Card hooks and adding drive specifiers to the file names in the program.

With machine language, the possibilities are even greater. All it needs is the interest of software developers. The developers of Gold Card and *GolDOS* have done their utmost to encourage this development. The *GolDOS* manual is an excellent example of this attitude, clear, concise, and very well written. It's not fancy, but it's one of the best I've seen. It proceeds logically and explains everything from the simplest operations, for the non-programmer, to the most complex capabilities, for those who write their

own software. The manual is filled with examples and sample programs to explain the use of advanced features. They obviously want to make it easy for you. The GoldOS operating system's developer, King Computer Services, has developed a cross compiler for writing C language programs for the Model 100, a cross assembler for writing machine language programs for the 100, and has released a book on option ROM programming. If developers pick up on this, you may soon see your wish list become a list of existing software.

SAVING THE BEST FOR LAST

Probably the hippest, slickest thing ever to come along is the ROM Eliminator! Built right into the Gold Card interface, this option lets you copy ROM's to a Gold Card. Then you can give the ROM's to your sister. You won't need them again. You can store as many ROM's as will fit on the card. A Gold Card Utility menu option loads RAMROM.CO into RAM. RAMROM.CO displays a menu of ROM's already on the Gold Card, with the extension .RM after their names. The screen shows whether the normal option ROM socket or the ROM Eliminator is currently active. Function keys offer options. F1 (Save) copies the image in the selected device (i.e., the socket or the Eliminator) onto the card and gives it the name you specify, adding an .RM extension. F2 (Load) loads an .RM file selected by the cursor into the Eliminator, automatically connecting the Eliminator and disconnecting the ROM socket. The image in the Eliminator is now your ROM and operates just like the real chip would. F3 (Switch) switches whichever connection was established. For example, if the socket was connected, the Eliminator will now be connected. With the Gold Card ROM in the socket, I load the Eliminator with another favorite. I use F3 to switch between them with just a couple keystrokes. When I need a ROM that I don't use very often, I "F2" it into the Eliminator, and I'm set to go. Quite an elegant hassle saver! When I write my own ROM's with the King Computer Services package, I can just load them onto the card, too. Nothing extra to carry, and no moving parts. This thing is unreal! If you intend to use option ROM's now or in the future, be sure to order your interface with this option.

Data Acquisition System For the Model 100/102 and Model 4

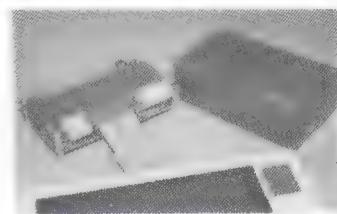
Provides engineers, technicians, educators, students and experimenters with a flexible solution to data acquisition and interface needs using the Model 100/102 or Model 4 computer.

M102-DACQ-1

\$185.00
8 digital input lines; 8 digital output lines; 8 bit A/D with 8 channel MUX (ADC0809); single channel 8 bit D/A (DAC0831); 3 channel, 16 bit prog timer (82C53); auto on/off; interfaces to system bus; 3 sq. in. wire wrap area; user manual, schematics, programing instructions/examples. Board, cabling, AC adapter and case (7.5" x 4.33" x 2.22") included.

M102-DACQ-SYS1

\$285.00
DACQ-1 plus a terminal board for easy access to all signals. The terminal board provides: large (12 sq. in.) wire wrap area; diode clamps on analog inputs; block terminals for analog signals; dual row header for digital signals.



Other options available, call or write for more information. Specify (M100-DACQ for Model 100, M4-DACQ for Model 4) interface cables.

Postage Paid, M/C, VISA, money order, check, approved P.O.
Sales Tax: add 4% (VT residents)

Rural Engineering Inc.

Route 14, Box 113F, So. Royalton, VT 05068
Tel. (802) 763-8367

Circle 88 on reader service card

TO BE CONTINUED ...

Rats! I'm running low on magazine space. So tune in next month for more details on the Gold Card, the ROM Eliminator, and other related products.

If it seems a bit pricey, consider the price, bulk, and maintenance of comparable peripherals. And where else will you get file editing on massive TEXT files, unlimited download to memory, and who knows what future developments. It's great to have a notebook that can compete with the big boys, with no moving parts, cold start immunity, dual RAM drives, removable storage that slips in and out in a second, heavy duty error checking (discussed next month), etc. Maybe I sound like a commercial, but I'm excited by the Gold Card. Check it out for yourself!

Bio: Mike Nugent is ...oh, forget it—
Hi Shannon! Hi Mom!

Manufacturer's Specifications

Standard interface: \$199.95
Industrial interface: \$299.95

Pull-up resistors on all leads, 8-layer board with ground planes for maximum radio frequency shielding, and other features.

ROM Eliminator option: \$100.00
Available on industrial interfaces

only

Cards:

128K: \$200.00
256K: \$350.00
512K: \$550.00

Enhanced Macro Key Program from Ultrasoft Innovations

Ultrasoft Innovations Inc. has announced the release of *Supera Version 3.0*, a time- and labor-saving macro key program for the TRS-80 Model 100/102 and Kyotronic KC-85 portable computers.

David Sumner's original *Supera* made it possible to save keystrokes by adding 26 user-definable function keys that could be used separately from within *BASIC*, *TEXT* or *TELCOM*, and *Version 3.0* has enhanced



The *Supera Version 3.0* allows repetitive work to be assigned to 26 function keys.

these features. New features include extended macros, which can now pause for user input and then resume either after a determined time interval or by pressing a special key combina-

tion. Also featured are a search for tabs and carriage returns via the *F1 "String"* function in *TEXT*, and an ability to search for *TEXT "selected"* with the *F7* function key.

For the first time, *Supera* makes it possible for the 100/102/KC-85 to edit two files at once, switching easily from one to the other.

Price is \$79.95. Previous owners can upgrade to the new version for \$39.95, available on Tandy 100K or 200K 3.5-inch disk, Chipmunk 3.5-inch disk, or standard cassette tape.

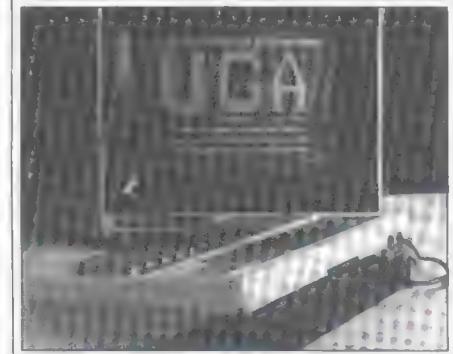
For further information, contact Ultrasoft Innovations Inc., 76 Main Street, P.O. Box 247, Champlain, NY 12919 (514)487-9293. Or circle #60 on your Reader Service card.

Create Your Own Option ROM's with ASM-100

The King Computer Services, Inc. *Option ROM* package consists of: a cross assembler and linker for the Model 100/102 that runs on an IBM PC or clone, allowing you to create .CO programs or ROMable programs; a conversion program to convert the resulting machine language code to a form that can be downloaded to the Model 100/102 or burned into an option ROM; programs for both ends, the IBM PC and Model 100/102, to transfer the result to the Model 100/102; the *Option ROM Library* that makes it possible to write and test code as .CO files

and then burn the final product into an option ROM; a manual containing a complete description of the theory of Model 100/102 option ROM's, in an easy-to-understand and thorough explanation of the technical aspects of the subject; and source code for the utility programs.

Price of the *Option ROM* package (ASM-100) is \$395.00. Developers who already have parts of the package may buy portions. King Computer Services, Inc. also sells option ROM's, ROM carriages, ROM burners, ROM erasers, a C Cross-compiler and C libraries for the Model 100/102. For further information, contact King Computer Services, Inc., 1016 North New Hampshire, Los Angeles, CA 90029 (213)661-2063. Or circle #62 on your Reader Service card.



The Secrets of ROM Revealed

Many computer owners are able to burn ROM's for their machines, and yet for the Model 100, a machine specifically designed for programming on a ROM, the methods for doing this have been a closely-guarded commercial secret for years. Take advantage of an extra 32K worth of storage space on your Model 100. Find out how to put your favorite machine language Model 100 program on an option ROM.

The Secrets of ROM Revealed contains concise, easy-to-understand information, written by an author with years of experience with the Model 100 and option ROM's. Some of the material covered in this book includes:

source code, complete listings of what you need to call standard ROM routines from an option ROM, calling the text editor from .CO and option ROM programs, lists of resources to get you started, and how to write option ROM's for the Model 200 and NEC 8201A.

The book is available from King Computer Services, Inc. for \$39.95 plus \$3.00 S&H (California residents add 6.5 percent sales tax; non-USA add \$10.00). For an additional \$10.00 an IBM PC diskette with source code of key routines and the complete search and replace utility will be included. For further information, contact King Computer Services, Inc., 1016 North New Hampshire, Los Angeles CA 90029 (213)661-2063. Or circle #63 on your Reader Service card.

80 x 25 Video Interface!

Connect your notebook computer to an 80 x 25 composite or RGB video monitor for full-screen 80-column by 25-line editing, just as on a PC.

Ultrasoft Innovations, Inc., has announced *ULTRA GRAPHICS ADAPTOR* for Tandy 100/102, with other notebooks.

UGA connects via the system bus and measures only 11.5 x 2.75 x 0.875 inches. *BASIC*, *TEXT*, *TELCOM*, *ADDRSS*, and *SCHEDL* are all supported, as well as the full 256 ASCII character set.

UGA begins shipping 10/1/88, priced at \$199.95 (\$249.95 in Canada). Order before 9/15/88 are eligible for a 15% or \$30.00 discount: order before 9/1/88 are eligible for free shipping. Visa, MC, AMEX, COD (UPS, cash only). S & H add \$5.00, COD add \$3.00.

For more information, contact Ultrasoft Innovations, Inc., 76 Main Street, P.O. Box 247, Champlain, NY 12919; (514)487-9293. Or circle #64 on your Reader Service card.

C100: The C Cross Development System for the Tandy Model 100/102

C100 is a cross development package that allows C code to be developed, compiled and assembled on an IBM PC, MS-DOS or CP/M machine. The resulting code can be downloaded to a Tandy Model 100/102 as a machine language ".CO" file. An optional Library allows the creation of Option ROMs containing your C program. The development process is almost identical to any C development and users who have previously worked in C will recognize the steps. The C Compiler supports in-line assembly language, allowing the user to mix C code and assembler in the same source code file.

The C100 Standard Library package includes a large collection of the functions that have come to be recognized as C standards. The libraries may be used in commercial applications with no additional licensing fee, and include keyboard, LCD, and file IO, memory and string routines, and a host of special Model 100/102 services such as phone dialing, graphics and sound. Optional libraries are available for Floating Point math and specialized Option ROM functions.

Prices start below \$900.00. King Computer Services can also provide Option ROM hardware such as EPROM Burners, Option ROM carriages and ROM emulators for testing 32K Option ROMs. For further information contact King Computer Services, Inc., 1016 North New Hampshire, Los Angeles, CA 90029 (213)661-2063. Or circle #65 on your Reader Service card.



Ultralucent and Ultralucent EL safely restore scratched computer displays.

Ultralucent Eliminates Screen Scratches

UltraSoft Innovations Inc. has introduced *Ultralucent*, a screen-restoration product which eliminates hairline, minor and deep scratches from the hard plastic display of any laptop or notebook computer. Ultralucent's simple application process allows any user to repair the damage himself, thereby avoiding costly replacement charges.

Ultralucent is available in a standard kit that includes six re-usable, color-coded abrasive pads, anti-static finishing cream, application foam block, wiping towel, and complete instructions for only \$19.95. For minor touch-ups, and for laptops with soft plastic displays, Ultralucent EL is available for only \$14.95.

For more information, contact UltraSoft Innovations Inc., 76 Main Street, P.O. Box 247, Champlain, NY 12919 (514)487-9293. Or circle #68 on your Reader Service card.

EDIT FILES LARGER THAN 29K

A new text editor, *GoldText*, is now available for the Model 100/102. *GoldText* edits files on the Gold Card storage device (SoundSight, Inc.). Any combination of text files up to the total size of the Gold Card (128K, 236K, 512K, etc.) may be edited at will with *GoldText*. *GoldText* operates exactly the same as the Tandy editor in almost all cases and therefore is very easy to use by experienced Model 100/102 users. Its search capability is fast and its editing and display does not slow down when working with large files. Going top to bottom of large files takes seconds. Closing very large files takes a second or two. The *GoldText* SAVE

and LOAD functions provide Gold Card owners with a safe and easy means to download/upload text files to and from their Model 100/102 through the COM (RS-232) port. Since Gold Card text files are permanent, like disk files, they can survive a cold boot of the system. Therefore, Model 100/102 users may now keep all their text files safe on the Gold Card, use *GoldText* to edit them, and have all RAM available for their programs. For further information contact SoundSight MBM Inc., 225 West Broadway, Suite #509, Glendale, CA 91204 (213)463-9457 or (818)240-8400. Or circle # 69 on your Reader Service card.

DEFUSR appears monthly to answer your questions about Tandy notebook computers.

*Send your queries to: DEFUSR, PORTABLE 100,
P.O. Box 428, Peterborough, NH 03458-0428.*

Please enclose a stamped, self-addressed envelope for our reply.

TS-DOS VS. SUPER ROM

With reference to your April, 1988 issue, Mr. Kevin Marsh of Greenville, SC, stated "WARNING, TS-DOS and PCSG's Super ROM are not compatible," and in the June, 1988 issue this claim was rebuked by Gary L. Matthews of Knoxville, TN. Actually, depending on their use, both readers are correct.

After *Super ROM* is installed, you can kill it with *CALL 63012,0,1* and physically remove the chip. You might think that's all you need to do to remove *Super ROM*. Wrong! The system will crash if you attempt to use the resident "Save to:" portion of *TS-DOS* from within a text file, as I demonstrated to Mr. Matthews over the phone.

If *Super ROM* has been run first, you must run *TS-DOS* from the main menu before attempting to access "Save to:FILE.D0" from text or any *Super ROM* program. *Super ROM* is addressed to an overlapping position with *TS-DOS* in high memory. All high memory, therefore, must be cleared out before you can use the resident portion of *TS-DOS* to save files from text. You are using only a portion of the program in this mode which, as far as *TS-DOS* is concerned, knows nothing about its program being compromised by

Super ROM. "Save to:" tries to run and *TS-DOS* fails.

The following *CLEAR.BA* program will eliminate a crash but becomes an extra step:

*The following
CLEAR.BA program
will eliminate a crash,
but becomes
an extra step.*

```
10 CALL 32454
20 CLEAR 0,MAXRAM
30 CLEAR 256,57400
40 MENU
```

This will clear out everything in the machine without losing files. *CLEAR 256,57400* will allow *TS-DOS* or *TS-100.CO* to function as you return to the menu.

If you save files from the main menu, *TS-DOS* or *TS-100.CO*, everything works fine. Mr. Matthews has been using it this way; therefore, his remarks are valid. However, it is possible that Mr. Marsh prefers the quick "Save to:" method as I do.

I believe Traveling Software has a built-in "clear" function in their program, similar to the one I have described, which is activated when you exit to the menu. Proof is the absence of the PG Design menu after exiting the *Ultimate ROM II*. Had *Super ROM* incorporated a "clear" function in their software, there would be no such problem between the two. I might suggest PCSG modify their program to prevent this from happening.

I hope this will assist your readers in using both programs without a crash.

Ross G. Brochhagen
South Orange, NJ

SHAME ON YOU OLLY!

Okay guys! While reading my July/August (everyone deserves a vacation) issue of *Portable 100*, I ran across an Editor's Note that says: "...I get very upset every time I find a listing with an error...."

Then, a few days later, while

Is the screen on your Laptop **SCRATCHED**? Then restore it yourself with...



ULTRALUCENT is a scientifically engineered set of cushioned abrasives that will restore the hard plastic display of any laptop or notebook computer back to "just-out-of-the-box" BRAND-NEW condition. ULTRALUCENT will remove haziness, hairline scratches, minor scratches and deep scratches. Screen restoration takes just minutes, but the benefits can be seen immediately and are long lasting. And it is so easy to use too! ... Larry Turner, Photographer, Montreal!

ULTRALUCENT is unconditionally & fully guaranteed for 100% satisfaction or your money back! Here's what you get:

- 6 cloth-backed, color coded, re-usable cushioned abrasive pads
- Application foam block
- Anti-Static Finishing Cream for removal of abraded particles
- Wiping towel and complete instructions

All this for only \$19.95 + \$3.00 Shipping & Handling. To order (VISA, MC, CHECK or COD), phone or write:

ULTRASOFT INNOVATIONS INC. 76 Main Street, P.O. Box 247, Champlain, NY 12918 Tel. (514) 487-9283 (9-5 EST)
DEALER INQUIRIES WELCOME! Laptops with soft plastic displays can use our ULTRALUCENT EL (\$14.95 + S. & H.)

Circle 37 on reader service card.

browsing through back issues, I came across your response to Fred Forrester (January '88 "I/O"). In it, you suggested a method of embedding escape codes for the DMP series printers within text files on the Model 100.

Come on, folks! Did you *try* this before you suggested it? Whenever I press F2 (LOAD) while in text mode, my Model 100 looks for a cassette file, not a RAM file [even after correcting the obvious error in line 20 "PRINT #1, CHR\$(27)"]. How did you get yours to look for RAM instead???

I sometimes use a DMP 2110 to print files from the Model 100. And it sure would be nice to know how to print those underlines, boldface, etc., when I do. As Mr. Forrester stated, the printer manual ain't much help! Any more suggestions?

Bob Gaskins

Incline Village, NV

The erroneous response was what we in the magazine biz call [expletive deleted]. Its author, Olivetti Del Bksp, was subsequently demoted to Editorial Assistant in Charge of Pressing ENTER, which keeps him busy and out of trouble. Meanwhile, sharp readers provided more realistic solutions (April '88 "I/O").

-MN

[Okay, Olly, press ENTER now...]

IN SEARCH OF LAPSTAR

Here is my subscription and my plea. In 1985 the old version of Portable 100 ran an advertisement for LapStar, a taped word processing program that used WordStar-like commands. The address in the ad is no longer the address of CISS Corporation, the company, or of Randy Moore, the name associated with the

software.

PLEASE—can anybody tell me how to get *LapStar*? I keep automatically using *WordStar* commands on my little Tandy, and it doesn't understand.

Kay Kruse-Stanton
Menomonie, WI

You might also want to check out Write ROM, part of the Super ROM from Portable Computer Support Group, 4540 Beltway Dr., Dallas, TX

By Teachers for Teachers Grade Management System

PERSONALIZED ... STAY ORGANIZED

You Set Up To:
12 Grade Values • 9 Classes
50 Students

3½ Disk for PDD
TANDY 100/102 - 200

We also customize 5 basic programs
\$49.00 + \$2.00 (S & H)

Software by Steffens'
1731 William Ct.
Little Chute, WI 54140

Circle 29 on reader service card.

commands, either!)

-MN

A CALL TO THE SUBSCRIBERS

Does anyone know a way to send a true break on a Tandy laptop?

Jim McGill
Illinois

Can anyone help us?

-MN

PBBS, WHERE ARE YOU?

None of your masthead pages includes the Portable BBS phone number — although they all tell me where to call if I want to place an ad! Do I need a security clearance to find the BBS number? Why not publish it in the masthead of every issue — for those of us with short memories and not enough RAM for another ADRS.D0 file entry?

Bob Gaskins
Incline Village, NV

Ummm...okay! The Portable BBS phone number is (603)924-9770. Set your computer to 300 or 1200 baud, eight-bit words, one stop bit, no parity, and XON/XOFF protocol. The number will be published in the masthead from now on.

-MN

*Do I need a
security clearance
to find the Portable
Bulletin Board
System number?
Why not publish it in
the masthead?*

75244; Tel. (800)544-4699. Like WordStar, it uses "dot" commands, plus it offers much more. Write ROM was reviewed in Portable 100, Aug. '85. SUPER ROM was reviewed in the May '86 issue. (I know how your little Tandy feels — I don't understand WordStar

Cross-Bank TELCOM

Modifying an unpublished program originally conceived by Wilson Van Alst (CompuServe ID 76576,2735), I have written a package of programs I call *TLBNK2.200*, which allows on-line bank switching using a modem, this month's topic.

Last month I showed you how to write BASIC programs, such as *XBASIC.CO*, that access files (or chain to programs) in another bank of your Tandy 200. Unfortunately, because *XBASIC.CO* runs in the alternate LCD buffer (*TELCOM*'s storage area for the previous screen), *XBASIC.CO* cannot be accessed while on-line with *TELCOM*.

With only 19.5K of RAM in each bank, the amount of data you can transmit or receive is limited. But although this available upload/download RAM is small, you can overcome this limitation. A BASIC program using *XBA-*

Give TELCOM the ability to switch RAM-banks without losing the carrier signal.

SIC could allow direct upload/download access to the other banks, and even if that program is a RAM hog, you can still have access to two remaining banks.

But here is another approach that serves almost as well: give *TELCOM* the ability to switch RAM banks while on-line without losing the carrier sent by the host system. This method can perform bank switching, using external modems as well as the built-in, 300-baud modem of the Tandy 200.

Over the past few years, I have seen several *TELCOM*-like programs that offer features ranging from simple auto-redial to split screen capabilities for on-line conferencing to *XMODEM* protocol for data transfer. Some of

Bnk	File	Purpose
3	<i>ADRS.DO</i>	store phone no.'s
3	<i>BBSLOG.DO</i>	keep track of calls
2	<i>TLBNK2.BA</i>	WP1200 auto dialer
2+1	<i>XBASIC.CO</i>	cross bank BASIC
1	<i>TEL2.BA</i>	link to term mode
1	<i>TIMER.BA</i>	adds time to <i>BBSLOG</i>

Table 1. The *TLBNK2.200* files.

```
; ****
; *          XTELCOM.CO          *
; *          by Paul Globman    *
; *          Copyright (C) 1988   *
; ****
;
BYTES: EQU 9AFDH
CLS: EQU 20301
CRLF: EQU 4F3EH
FILES: EQU 2A2AH
FRAME: EQU 65196
GONE: EQU 9CA8H
HOOK28: EQU F53DH
NEWBNK: EQU EEF5H
POKE: EQU 9BB0H
STAT: EQU EF3CH
TEL6: EQU F53FH
TEL7: EQU F541H
TLCOM: EQU 24573
;
ORG 60930
;
CALL SETHK ;set the hooks
JMP TLCOM ;enter TELCOM
=====
SETHK: LXI H, SHOFIL
```

continued.

Listing 1. The source code for *XTELCOM.CO*.

THE CUSTOM 200

these programs use the Tandy 200 internal modem, while others address external modems such as the WorldPort 1200.

The XMODEM programs retain control of the serial port, while the non-XMODEM programs usually enter the ROM-based TELCOM software once they make the connection. The needs of users vary widely, and many of the TELCOM-like programs are efforts to combine the best features of previous offerings.

Quite possibly, the bank-switching methods presented here will someday be incorporated into a full-featured, telecommunications program. But my objective here is to provide insight into bank switching in general, and not to attempt a full-featured application.

XTLCOM.CO AND THE INTERNAL MODEM

XTLCOM.CO, assembled using the assembly language code shown in Listing 1 or created by the BASIC program shown in Listing 2, is a *front end* (preprocessor) to the built-in TELCOM program. By entering TELCOM via XTLCOM.CO, you will add two additional capabilities to F6 and F7 while on-line. To do so, the built-in BRK function hooked to F7 is disabled.

By entering TELCOM via XTLCOM.CO, you will add two additional capabilities to F6 and F7 while on-line.

As with most .CO files that run in the HIMEM to MAXRAM area, you must reserve a safe area in memory for XTLCOM to run. CLEAR 256,60930 (from BASIC) provides that safe area. When you place the cursor over XTLCOM.CO and press ENTER, you should find yourself in TELCOM.

Proceed with your telecommunications as usual. When the connection is made and you are in the TERM mode, F6 displays all RAM files and bytes free in the current bank. Here, pressing F7 switches you into TELCOM of the next RAM bank, and SHIFT-F7 switches you into TELCOM of the previous RAM bank. Once switched, press F4 to re-enter the TERM mode.

One minor drawback to this bank-switch feature is that the bank you just switched to will not have these F6/F7 features installed. So once you switch banks, you have to remain in the new bank for the duration of your on-line connection. Therefore, I recommend that you review the status of each bank prior to the call. Decide which bank you should call from initially and which bank you will switch to.

Base these judgments on your plans to upload or

```
SHLD TEL6          ;F6=files disp.
LXI H,JMPBNK
SHLD TEL7          ;F7=bank switch
LXI H,CLRHK
SHLD HOOK28        ;reset hooks
RET

=====
SHOFIL: CALL CRLF   ;CRLF
          CALL FILES   ;display files
          CALL BYTES   ;and bytes free
          JMP CRLF    ;CRLF and ret.

=====
CLRHK: LXI H,GONE   ;restore RST 7
          SHLD TEL6   ;hooks to their
          SHLD TEL7   ;initial config
          SHLD HOOK28 ;ie.. a return!
          RET

=====
JMPBNK: di          ;shift?
          lda 64790
          rar
          in d8h
          cc nxt
          lxi h,cont
          push h      ;get this bank
          ;backward
          ;continue after
          ;next return!

;
nxt:  adi 4          ;forward
      ani 0ch
      cpi 0ch
      jz nxt
      ret

;
cont: sta blkmov+2  ;set dest bnk
      sta bsw+1
      lxi h,newbnk
      mvi b,0
      mov d,a
      call poke    ;and poke bank
                  ;#1 with new
                  ;active bank

;
      lxi h,stat    ;copy stat to
      mov d,h      ;destination
      mov e,1      ;bank
      lxi b,7
      call blkmov

;
      lxi h,bsw    ;move code to
      lxi d,63600  ;dest bank
      lxi b,blkmov-bsw
      call blkmov

;
      lxi h,bsw    ;also move code
      lxi d,63600  ;to current bnk
      lxi b,4      ;only 4 bytes!
      call 8316h   ;move it
```

continued.

```

;
lhd frame
jmp 63600
=====
bsw: mvi a,0 ;this code was
      out d8h ;moved to 63600
;
shld frame ;adj frame shft
lxi sp,63900
call 4c47h ;reset sp
call cls
;
xra a ;clear keyboard
sta 64798 ;buffer
JMP tlcom
=====
;The following code will move a block
;of memory in current bank to any
;location in destination bank.
;Destination bank poked to blkmov+2 by
;earlier code.
;BC=len, HL=source adrs, DE=dest adrs
;
blkmov: push b ;save counter
      mvi b,0 ;dest bank in B
      push d ;store dest adr
      mov d,m ;data byte in D
      xthl ;dest adr in HL
      call poke ;POKE it!
      pop d ;restore DE and
      xchg ;HL registers
      pop b ;restore BC:len
;
      inx h ;increment ptrs
      inx d ;to do next.
      dcx b ;decrement len
      mov a,c ;and test if B
      ora b ;and C are 0
      jnz blkmov ;done if BC = 0
      ret
=====

```

End of listing.

download data, which bank contains the material to be uploaded, and which bank has available RAM for downloads.

TLBNK2.BA AND EXTERNAL MODEMS

I use a WorldPort 1200 (WP1200) external modem, for which the bank-switching approach is quite different. While the modem holds the carrier, I can exit TELCOM, go to the MENU, switch banks, run programs, edit files, and return to TELCOM to continue my on-line connection. The use of an RS-232C A/B switch (to switch two RS-232C lines between two devices) allows me to load or save to the Portable Disk Drive (PDD) while the modem maintains a carrier to the host computer.

To accomplish this, the WP1200 requires a Data Terminal Ready (DTR) signal from the Tandy 200's RS-232 port, but when the Tandy 200 exits TELCOM to the MENU, DTR is dropped and the WP1200 turns off. You must open the WP1200 and re-position the DIP switch DIP SW4 to the ON position (DTR ignored) and/or use an external power supply.

I modified the program as conceived by Wilson Van Alst to require XBASIC.CO and to use all three RAM banks.

TLBNK2.BA (see Listing 3) is a modem *dialer* program that runs in bank 2, but looks for ADRS.DO in bank 3. The FIND function works similarly to TELCOM's F1, except it is case sensitive. You must enter upper case if your ADRS.DO file contains upper case.

When your first FIND is displayed, press ENTER to dial, down arrow for next FIND, or ESC to quit. TLBNK auto-redials if it detects no carrier, and beeps twelve times when it detects the carrier (the twelve beeps also serve as a 1.5-second delay).

Continued on page 31

```

1 ****
2 /* XTLCOM.CO */
3 /* by Paul Globman */
4 /* Copyright (c) 1988 */
5 ****
10 FOR I = 60930 TO 61103
20 READ X:POKE I,X:SM=SM+X
30 NEXT
40 IF SM = 22791 THEN 60
50 PRINT "error in data":STOP
60 SAVEM "XTLCOM.CO", 60930, 61103, 60930
1000 DATA 205, 8, 238, 195, 253, 95, 33, 27
1010 DATA 238, 34, 63, 245, 33, 52, 238, 34
1020 DATA 65, 245, 33, 39, 238, 34, 61, 245
1030 DATA 201, 205, 62, 79, 205, 42, 42, 205
1040 DATA 253, 154, 195, 62, 79, 33, 168, 156
1050 DATA 34, 63, 245, 34, 65, 245, 34, 61
1060 DATA 245, 201, 243, 58, 22, 253, 31, 219
1070 DATA 216, 220, 66, 238, 33, 76, 238, 229
1080 DATA 198, 4, 230, 12, 254, 12, 202, 66
1090 DATA 238, 201, 50, 157, 238, 50, 133, 238
1100 DATA 33, 245, 238, 6, 0, 87, 205, 176
1110 DATA 155, 33, 60, 239, 84, 93, 1, 7
1120 DATA 0, 205, 155, 238, 33, 132, 238, 17
1130 DATA 112, 248, 1, 23, 0, 205, 155, 238
1140 DATA 33, 132, 238, 17, 112, 248, 1, 4
1150 DATA 0, 205, 22, 131, 42, 172, 254, 195
1160 DATA 112, 248, 62, 0, 211, 216, 34, 172
1170 DATA 254, 49, 156, 249, 205, 71, 76, 205
1180 DATA 77, 79, 175, 50, 30, 253, 195, 253
1190 DATA 95, 197, 6, 0, 213, 86, 227, 205
1200 DATA 176, 155, 209, 235, 193, 35, 19, 11
1210 DATA 121, 176, 194, 155, 238, 201
1220 REM END OF DATA

```

End of listing.

Listing 2. XTLCOM.BA, the BASIC program to create XTLCOM.CO.

BACK ISSUES!

Ever since we bought Portable 100, the most frequently asked question has been, "Do you have any back issues?" Up until now the answer has been, "No." Nevertheless, all this time we have been tracking down a rumor that somewhere in Camden, Maine, was a barn loaded with old issues of Portable 100. Well, we finally ran it to ground and found the barn, the issues, and the barn's owner. To make a long story short, we now have Portable 100 back issues. The bad news is that we have only a limited number of issues, merely 100 per month published, thirty-one months in total, plus those of our own (see chart below).

Because of this these pre-1987 collector issues are available for \$19.95 each, postage and handling included. The issues from August 1987 to present are \$5.00, postage and handling included.

To help you decide which issues you want, we've put together a special, comprehensive 20-page article index covering every issue published from September, 1983 (premier issue) to the July/August 1988 issue. This index is available for only \$5.95, plus \$1.05 shipping and handling. The \$5.95 will be credited against your first back issue order.

Month	83	84	85	86	87	88
January			NOT PUBLISHED			OUT
February						
March			OUT			NOT PUBLISHED
April		OUT			PUBLISHED	OUT
May		OUT				
June		OUT				
July		OUT		OUT		
August						NOT PUBLISHED
September	Premier Issue					
October		OUT		NOT PUBLISHED		NOT PUBLISHED
November				PUBLISHED		YET PUBLISHED
December						PUBLISHED

Is the issue you want sold out?

If so, photocopies
of the articles are
available. Get the
Article Index for
details.

- Send me the Portable 100 Article Index for \$7.00 (\$5.95 + \$1.05). I understand the \$5.95 cost will be credited to my first back issue order.
- Please send me the back issues I've indicated above (pre-1987—\$19.95 each; 8/87-on—\$5.00 each; shipping and handling charges included).

PAYMENT MUST ACCOMPANY ORDER

- CHECK ENCLOSED MC VISA

Total enclosed: _____ CARD# _____ EXP. DATE _____

BE SURE TO INCLUDE ENTIRE CARD NUMBER

NAME _____

STREET ADDRESS _____

CITY _____ STATE _____ ZIP _____

The program maintains a log file, *BBSLOG.DO*, in bank 3. When it detects a host system carrier, *TLBNK2.BA* updates *BBSLOG.DO* in bank 3, sends your auto-log-on sequence, and chains to *TEL2.BA* in bank 1.

TEL2.BA (see Listing 4) is a dual-purpose program. If entered automatically via BASIC's *IPL* function (*TLBNK2.BA* chains to *TEL2.BA*), *TEL2.BA* starts in the terminal mode. If you enter *TEL2.BA* from the menu, it jumps to bank 2 and runs *TLBNK2.BA*, allowing easy access to *TLBNK2* from bank 1.

TIMER.BA (see Listing 5) lets you to add the connect time to the last entry in your log file. After logging off you can run *TIMER.BA*. It asks, "How many minutes?" and your response is logged to *BBSLOG.DO* in bank 3.

Table 1 shows which file is used in which RAM bank. *XBASIC.CO* is required in banks 1 and 2. I've been using these programs for several months, with excellent results.

by Paul Globman

Editor's note: Paul Globman can be reached by modem on CompuServe (72227,1661), on GENie (P.GLOBMAN), or in the south Florida (Ft. Lauderdale) area on TeleBits BBS, (305)753-2677 (ask sysop for access to Paul Globman).

```

1 MAXFILES=2:CLEAR256:IPL"":LOADM"XBASIC"
":DEFSTRA-G:F="COM:57I1ENN":CLS
2 CALL63600,0:G="3:ADRS":CALL63600,1,VAR
PTR(G):LINEINPUT" Find: ":";A
3 IFPEEK(63605)=17THEN2ELSED="" :CALL6360
0,3,VARPTR(D):I=INSTR(D," :"):B=LEFT$(D,I
)
4 IFINSTR(B,A)THENJ=INSTR(I,D,"<"):IFJTH
EN5ELSE3ELSE3
5 C=LEFT$(D,J-1):PRINTC::E=INPUT$(1):IFE
=CHR$(27)THENMAXFILES=1:MENUELSEPRINT:IF
E=CHR$(31)THEN3
6 A3=MID$(C,I+1):A2=MID$(D,J+1):MID$(A2,
LEN(A2))=CHR$(0)
7 CLOSE:OPENFFORINPUTA1:OPENFFORPUTA
S2:PRINT#2,"ATZ":CALL25102:PRINT"Command
String: ";:PRINT#2,"ATX4S7=15DT"A3
8 LINEINPUT#1,A:PRINTA:IFINSTR(A,"BUSY")
ORINSTR(A,"NO ")THEN7ELSEIFINSTR(A,"CONN
ECT")=0THEN8
9 IPL"TEL2.BA":FORI=1TO12:BEEP:NEXT:G="3
:BBSLOG":CALL63600,0:CALL63600,2,VARPTR(
G):G=CHR$(13)+CHR$(10)+DAY$+" "+DATE$+
"+TIME$+" "+LEFT$(B,3)+" :" :CALL63600,4
,VARPTR(G):V=VARPTR(A2):CALL25301,0,PEEK
(V+1)+256*PEEK(V+2):CALL34327:CALL63600,
5,1

```

End of listing.

Listing 3. TLBNK2.BA is a modem dialer program that runs in bank 2, but looks for ADRS.DO in bank 3.

```

0 IFPEEK(63560)=0THENIPL"" :OPEN"com:57i1
enn"FOROUTPUTAS1:PRINT#1,CHR$(17):CALL25
464
1 LOADM"XBASIC":IPL"txbnk2.ba":CALL63600
,5,2

```

Listing 4. TEL2.BA is a dual-purpose program. From the IPL routine it starts in terminal mode. When entered from the menu, it jumps to bank 2 and runs TLBNK2.BA

```

1 IPL"":INPUT"How many minutes";M$:M$=M$+
" min":X$="3:BBSLOG":LOADM"xbasic":CALL
63600,2,VARPTR(X$):CALL63600,4,VARPTR(M$)
:CALL63600,0:MENU

```

Listing 5.TIMER.BA lets you to add the connect time to the last entry in your log file.

CUSTOMIZE YOUR TANDY 200!

*Now you can take advantage of Paul
Globman's Custom 200 programs
without spending hours typing and
even more hours debugging.*

That's right, *The Custom 200* programs that make your Tandy 200 friendlier and more efficient are now available on Tandy 100K Portable Disk Drive disks.

So far we have two sets of disks to offer:

Disk Set 1—Reverse Bank Switching, Displaying Three Directories At Once, Multi-Tasking and Background Printing, and Program Chaining.

Disk Set 2—Cross-Bank Pasting, Cross-Bank BASIC, and Cross-Bank Telcom.

- Please send me Disk Set #1 for \$14.95.
- Please send me Disk Set #2 for \$14.95.
- Please send me both sets for \$29.90.

PAYMENT MUST ACCOMPANY ORDER

- CHECK ENCLOSED MC VISA

Total enclosed: _____

CARD# _____ EXP. DATE _____ BE SURE TO INCLUDE ENTIRE CARD NUMBER

NAME _____

STREET ADDRESS _____

CITY _____ STATE _____ ZIP _____

Portable 100, Custom 200 Disks, P.O. Box 428,
Peterborough, NH 03458

The Portable 100 Classifieds

SERVICES

MODEL 100, 102 200 SUPPORT (Five-Year-Old Club)

Ongoing support for Tandy/Radio Shack Model 100, 102 and 200 owners. International support by mail, voice, and bulletin board. Free on-line weekly newsletter 300/1200 baud, 8-bit, 24hrs/7days, 415-939-1246. Voice recording: 425-937-5039.

For INDEX of public domain library, "how to" bulletins, product reviews, write to: CLUB 100, A Model 100 User Group, 984 Hawthorne Drive, Walnut Creek, CA 94596

Patent Attorney Donavon Faure (703) 920-2962

Model 600. Programs/Newsletter. Send S.A.S.E. for Info. Easy Ware Products; PO Box 218778; Houston, TX 77218-8778

SOFTWARE

SPC Programs for 100/102 Disk or Cassette-Quality Resources—840 McKinley, Plymouth, MI 48170

HARDWARE

Model 100 Hardware for sale: Chipmunk Disk Drive with software \$250, 128K RAM Expansion board \$150. Call 216-647-6371

Model 100, 120K expansion, 100K Tandy Drive, ROM VAULT, Super ROM, Business Analyst, TS RANDOM, Hardcase, Much More... \$1,250.00 1-800-327-7888. David Gravel, 16201 S.W. 95th Ave. #204, Miami, FL 33157

Free Information

For free information on products advertised in this issue of Portable 100, locate the Reader Service number corresponding to the advertisement that interests you. Circle the number on the Reader Service Card at the center of the magazine (or on the wrapper protecting the magazine if you are a subscriber) and drop it into the mail. The literature you've requested will be forwarded to you without any obligation. Please allow 3-5 weeks for delivery.

The Portable 100 Classifieds

HOW TO PLACE A CLASSIFIED AD

Categorize your advertisement (Hardware, Software, Services, Wanted, Etc.) and carefully type your message. We are not responsible for correctly interpreting handwritten advertisements. Phone numbers, street numbers, dimensions, and any abbreviations count as one word. Logos, company or product, are not allowed, neither are display advertisements. Business rates are \$1.60 per word; non-business rates (individuals advertising) are \$1.30 per word. Add up the cost and send the advertisement copy with a check, money order, Visa, or Mastercard number to: Portable 100 Classifieds, 145 Grove St. Ext., P.O. Box 428, Peterborough, NH 03458-0428, c/o Linda Tiernan. Make checks payable to Portable 100 Classifieds. Include your complete return address and phone number (phone number is printed only if it is included in the advertisement itself). Materials due the 1st of the month, two months prior to the magazine cover date (example: materials for the February issue must be received by December 1st.) Advertisements received after the deadline will appear in the next scheduled issue. Payment must accompany order. No refunds for advertisements that miss deadlines, regardless of reason. We reserve the right to change advertisement categories, and to reject, edit, or cancel any advertisement we deem improper. There are no agency discounts for classifieds.

For faster service call 603-924-7949.

Ad Category _____ No. of words x (1.60)(1.30) _____ # Issues to run _____

Name _____

Address _____

City _____ State _____ Zip _____

Total Enclosed x (Ad Cost x Issues) _____ Phone Number _____

Visa/Mastercard Number _____ Exp. Date _____

Signature _____

If more space is needed, please use a separate sheet of paper.

ADVERTISER

RS#	Page
** Back Issues	30
Custom 200	31
50 GENie	CIII
15 Optical Data Systems	5
88 P100-To-Go	1
70 Radio Shack	CII
88 Rural Engineering	22
** Secrets of ROM Revealed	11
29 Software by Steffens'	26
22 SoundSight MBM	CIV
Traveling Software	I1
34 Traveling Software	I2
36 Traveling Software	I3
Traveling Software	I4
37 Ultrasoft Innovations	26

Market Place

62 King Computer Services	23
63 King Computer Services	23
65 King Computer Services	24
69 SoundSight MBM	24
60 Ultrasoft Innovations	23
64 Ultrasoft Innovations	23
68 Ultrasoft Innovations	24

** Please contact this advertiser directly



Get 2 Free Hours*
Sign-Up Today!

Wise up to nightly savings online with GEnie.TM

"GEnie has opened my eyes to what an online service can do for me. I thought I knew it all until I discovered GEnie's vast array of Special Interest Groups, offering thousands of software files, dynamic bulletin boards, lively discussions and "tips" from the experts. Not to mention services like Comp-u-store Online® shopping service, USA Today Decisionlines and access to Dow Jones News/Retrieval.® And those friendly people at GEnie really give a hoot about being helpful, day or night.

Compare GEnie for selection, services and price, night after night. It will open your eyes too. Only GEnie offers you so much online, for less."

p.m. Byrd

Services Available	Compare & Save	Pricing **			
		Registration Fee	Monthly Minimum	Non-prime Time Rates	
Electronic Mail • CB • SIGs/User Groups • Travel • Shopping • Finance • Reference Professional • Leisure • Games • News	GEnie†	\$29.95	None	\$5.00	\$5.00
	CompuServe	\$39.95	None	\$6.00	\$12.50
	Other	\$49.95	\$10.00	\$8.40	\$10.80

*Get 2 Free Hours with Sign-Up.

Still just \$5 per hour. Get online today!

1. Have your major credit card or checking account number ready.
2. Set your modem for local echo (half duplex)—300 or 1200 baud.
3. Dial 1-800-638-8369. When connected, enter HHH
4. At the U#= prompt enter XJM11751,GEnie then RETURN.

Need help or more information? No modem yet? We can help. In U.S. or Canada call 1-800-638-9636 or write GEnie, 401 N. Washington St., Rockville, MD 20850.



We bring good things to life.

**Basic rates and services in effect 1/88 apply in U.S. only. †Non-prime time rates apply Mon.-Fri. 6PM-8AM local time and all day Sat., Sun., and nat'l. holidays. Subject to service availability. Some services offered on GEnie may include additional charges.

*\$10 credit applies. Offer good for 30 days from sign-up.

© 1988 General Electric Company, U.S.A.

Circle 50 on reader service card

Announcing:

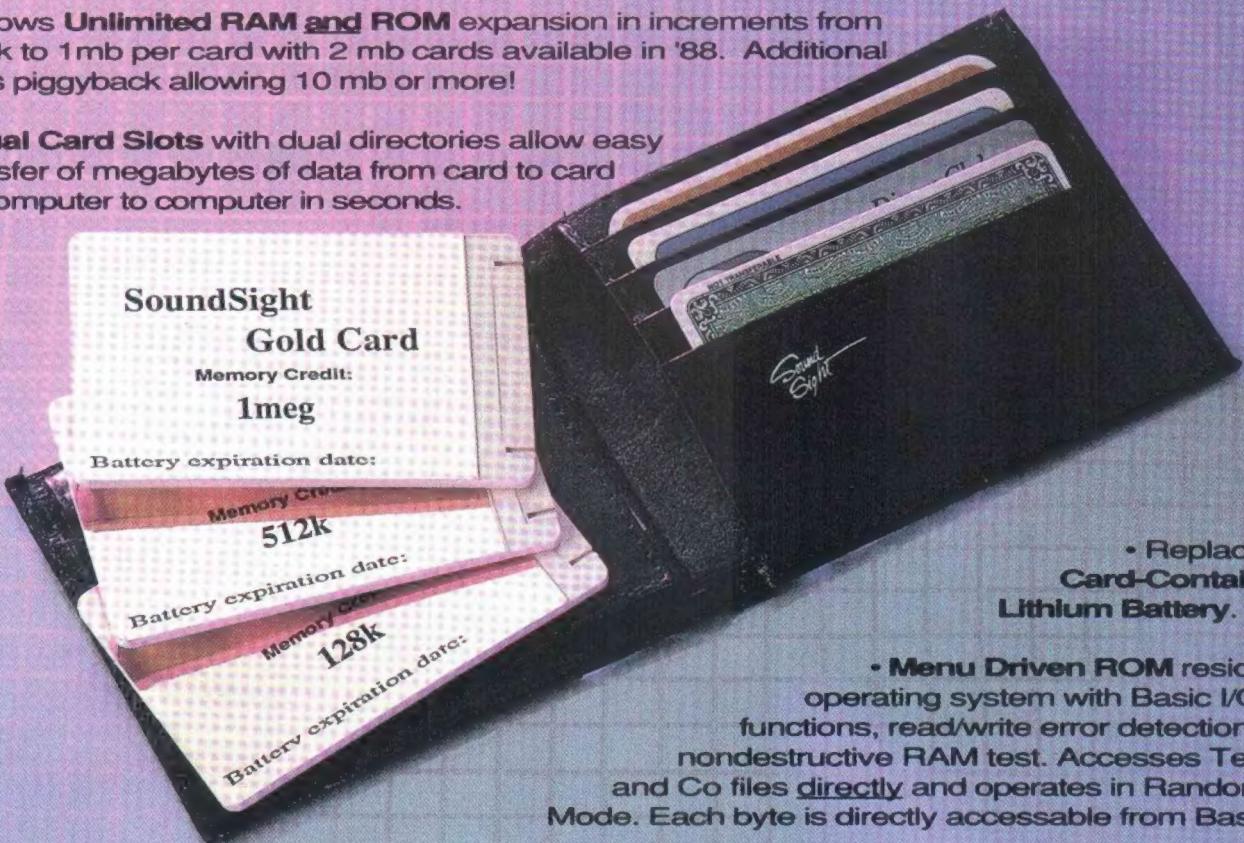
The SOUNDSIGHT GOLD CARD

Megabytes of memory on a credit-card-sized wafer
A mere 1/8" thick

Give your **Tandy 100/102** the power it deserves without sacrificing portability or adding bulky boxes. The SoundSight Gold Card lets you add as many megabytes of **RAM and ROM** as you wish with advantages other expansions just can't match.

- Allows **Unlimited RAM and ROM** expansion in increments from 128k to 1mb per card with 2 mb cards available in '88. Additional slots piggyback allowing 10 mb or more!

- Dual Card Slots** with dual directories allow easy transfer of megabytes of data from card to card or computer to computer in seconds.



- Replaceable, Card-Contained Lithium Battery.

- Menu Driven ROM resident operating system with Basic I/O functions, read/write error detection, and nondestructive RAM test. Accesses Text, Basic and Co files directly and operates in Random Access Mode. Each byte is directly accessible from Basic.

- SoundSight Gold Cards are also available in permanent One-Time-Programmable or Read-Only-Reprogrammable memory cards for large nonvolatile software application use in conjunction with RAM cards.

Optional new **ROM ELIMINATOR** lets you load and run multiple ROMs directly from the SoundSight Gold Card, dispensing with the need for extra ROM sockets or even having your ROM chips with the computer!



NEW OPTIONAL SOFTWARE DEVELOPMENTS:

- ROM resident Forms Generator with full Telecommunications and Desk Top package, for Law Enforcement Incident Reports, or any custom data entry applications.
- Point of Sale Inventory Control Software.
- New C Compiler compiles programs to machine code, condensing them to a fraction of their original size and speed. Runs them directly from cards.
- New GOLDTEXT Editor opens and edits files as large as available card RAM.
- New Compiler compiles basic programs to machine code, condensing them to a fraction of their original size and speed. Runs them directly from cards.

SoundSight offers **customized hardware/software** systems for law enforcement, retail, warehousing/distribution and other vertical markets, as well as third party dev. (C language). We're ready to meet your needs TODAY!

Pricing available from 128k to 10mb with 128k at \$399.95; 256k at \$549.95; and 512k at \$749.95; Additional cards for backup are available.

CONTACT:

SoundSight MBM Inc., 225 West Broadway, Suite #509, Glendale, CA 91204
Phone (213) 463-9457 or (818) 240-8400